

Perceptions of Adolescent Males and Their Parents as to Factors  
That Influence the Young Men's Academic Performance

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## **Abstract**

Postsecondary enrolments of young males has been declining since the mid-1980s. The decline can be attributed, at least in part, to boys and young men being unable to compete for a fixed number of available places in institutions of higher learning, whether in community college or university. This inability to compete stems from their academic performance in secondary school. This study interviewed adolescent males and their parents as to their perceptions of a number of factors that may contribute to their academic performance. Those factors included noncognitive skills, dimensions of character, perceptions of teachers, general attitudes towards school, and likes and dislikes on a range of course subjects. One of the most important findings was that only one of the seven adolescent male participants was considering a future career that would require a university degree. Other findings showed the young men's noncognitive skills were weak, particularly in relation to time management skills and their unwillingness to ask for help with schoolwork and homework. Most of the young men expressed a dislike for mathematics beyond high school, a subject key to the study, of the natural sciences, engineering, technology, and business. Recommendations include school reforms both inside the classroom and beyond. Additionally, a framework using project management theory and practice has been proposed to improve noncognitive skills, dimensions of character, and executive function.

## **Dedication**

This research is dedicated to two scholars who had and will continue to have profound influences on my personal and professional lives. I am honoured to have known them, laughed with them, and learned from them.

Dr. A. Jaan Saber

1946 – 1992

“Doc” Saber made a very dramatic entrance when he arrived to teach his first class at Loyola/Concordia University in 1975. In the two years that followed, he inspired me and others to take on engineering challenges never thought possible for such young, inexperienced engineers-to-be. Jaan taught me critical thinking, through his teaching and through his humour. He was one of the finest teachers I have ever had; I try to emulate his example every time I teach.

Dr. Michael Kompf

1949 – 2013

It is impossible to adequately describe the profound effect Michael had on me over the three short years I knew him. He brought out the scholar in me. He encouraged me to express my ideas, with temerity when needed. Michael believed that, as an academic, the students came first. He understood that he learned as much from his students and he taught them. His mentoring during my studies enabled me to achieve my most important professional success.

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## **Preface**

During the defense of this dissertation, the external committee member asked that I personally situate the thesis with respect to my career background and the early influences that framed my interest in the study and my vantage point. My response to that request follows.

My own character was strongly influenced by two periods of my early schooling and my experiences later in life as an engineer.. The first was when I attended a Catholic parochial elementary school in the United States over the period 1960-1966. Unlike the separate school system in Ontario, Catholic schools in the U.S. are administered directly by the Roman Catholic Church. The curriculum, while complying with state and national requirements, is set by the Church. Moral issues are front and center throughout the curriculum, along with observance of prescribed rituals, obedience to the dictates and demands of the Church, and acceptance of the idea that service and sacrifice are the pillars of daily life. Although I have since rejected Catholicism, I have continued to believe that service and sacrifice are the hallmarks of good character.

The most influential period of my early days started on a summer day in August 1969 when my mother announced that, in just three weeks from that day, I would be starting school at the Kentucky Military Institute (KMI). My younger brother received similar news, but he would be attending a different school. She had come to that decision because, at the same time, she would be starting her Ph.D. in communications studies, and did not want to deal with two teenage boys during her studies. Apart from the normal “separation anxiety”, the first few months were brutal, not just in adapting to a military

lifestyle, but also due to the Rat System, a period of mandatory, sanctioned subservience to upper classmen, and rampant, non-sanctioned hazing by those same upper classmen. In my sophomore year, based on my previous experience as a “rat”, I chose not to engage in those same rituals which I had found so personally demeaning.

Over time, I adapted, even thrived, in the military environment. I learned physical and mental endurance: try standing absolutely still for three hours, in full-dress wool uniform, in the mid-day Florida sun (our winter campus was in Venice, Florida). I learned that academics were more important than athletics. And, I learned that violations of the Honor Code—lying, stealing, and cheating, when proven, were met with immediate, same-day expulsion—was the worst offence any man could commit. Oh, and by the way, the school motto was “Character Makes the Man.”

My experience at KMI and the character that it developed has stayed with me ever since. It has enabled me to endure the demands of engineering studies, terrible jobs, several episodes of life-threatening illness, and difficult personal loss.

Now, fast-forward two decades to 1989. I had applied to a university to work on a master's degree in project management. Before going any further, I must say that my grades in engineering were, shall we say, less than stellar. There were a number of factors at play during my engineering studies which detracted from study time, but the details are not important. Nonetheless, in my working life to that point, I had been very successful as a mechanical engineer and project manager with a global resource company, and, as an entrepreneur in the construction industry.

The response letter to my application included following, and I quote, “based on your undergraduate grades, we do not believe you will ever be successful in graduate studies.” I was stunned. There appeared to be no redemption through demonstrated success in the field of study. But, I persevered. In 1998, I had the opportunity to study software engineering through a program sponsored by the National Research Council of Canada. I eventually applied for and completed a master's program in software engineering. Several years later, I completed a master's degree in distance education. And now, I am finalizing my doctorate in educational studies.

There were two lessons I learned from my academic tribulations. First, despite platitudes to the contrary, grades do matter; they follow you everywhere. In the 21<sup>st</sup> century the separation between the wheat and chaff is a very fine line. Secondly, perseverance can only truly be learned through failure, disenchantment, and difficulty. Perseverance does not always lead to its intended goal, but when it does, it helps us overcome the many trials life throws at us.

When I was in my mid-40s, I learned that I had adult attention deficit disorder (ADD). It was a watershed event, helping to explain some the difficulties I had had in my life. I slowly realized that the project management skills I had learned in professional life—most importantly, time management—had helped me avoid even greater difficulties that many adults with ADD experience.

This research has raised a number of issues regarding the academic performance of young males and how it affects them for the rest of their lives. My engineering nature

will not allow me merely to didactically identify a problem without also offering my thoughts on a solution. While writing this dissertation, I recalled the realization I had made about how project management has helped me to navigate, for me anyway, a very noisy and distracting world. It is hoped that the groundwork for the framework on teaching life skills using project management can help young adults, both male and female, navigate their own noisy and distracting worlds.

Patrick J. Tierney

November 2014

## **CHAPTER ONE: INTRODUCTION TO THE STUDY**

Secondary school academic achievement is the major criterion for acceptance into university (Cornwell, Mustard, & Van Parys, 2012; Evers, Livernois, & Mancuso, 2006). As a whole, high school graduation rates in Canada increased from 77.7% in 1997 to 88.4% in 2010, placing Canada second to only the United States (Conference Board of Canada, n.d.). Nonetheless, examining the population of individuals with a high school diploma as their highest level of academic achievement, males rose from 45.6% in 1996 to 47.4% in 2011 (Statistics Canada, n.d., 2007, 2013h, 2013i), which indicates an increase in the number of males not proceeding to higher education. Furthermore, males represent 45.2% of the entire workforce population with a bachelor's degree, down from 50.8% in 1996. These figures show males' declining success in completing an undergraduate credential.

The shift from a labour-intensive, manufacturing-reliant economy to a knowledge-based service economy has significantly increased the relative value of college and postgraduate degrees (Sommers, 2013). Studies by the Organisation for Economic Co-operation and Development (OECD) showed that, with the rise of knowledge-based economies throughout the developed world, having a higher level of education helped people to keep or change their jobs more readily following the 2008-2009 recession (Schleicher, 2013b). In practical terms, this has meant that a high school diploma is no longer sufficient for many occupations (HEQCO, 2012, 2013; Jacob, 2002; Poe, 2004). A recent Statistics Canada longitudinal study has shown that, over the period 1991-2011, a male with only a high school credential will earn about \$750,000 less than a

male with a bachelor's degree over their working life (Statistics Canada, 2014).

Although young men are performing satisfactorily on standardized tests, such as those from Ontario's Education Quality Accountability Office (EQAO) and the OECD's Programme for International Student Assessment (PISA), their day-to-day academic performance is suffering (Cornwell et al., 2012; Klinger, Shulha, & Wade-Wolley, 2009; Voyer & Voyer, 2014). There has been considerable attention in recent years by the public press to the “plight of boys” (Intini, 2006; Poe, 2004; Sommers, 2000, 2001, 2013, 2014). However, boys' and young men's underachievement in school has actually been documented and studied for a century (Voyer & Voyer, 2014).

Several studies have been conducted related to males' academic performance and declining postsecondary enrollments. Jacob's (2002) study analyzed data from the National Education Longitudinal Study of 1988 (<http://nces.ed.gov/surveys/nels88/>). Jacob identified boys' noncognitive skills (i.e., time management/organizational skills, willingness to ask for help, able to work in groups, and attentiveness in class) as a contributor to males' academic underperformance, having the same impact on scholastic achievement as socioeconomic circumstances. Card, Payne, and Sechel (2011), using data from the Ontario University Application Centre (OUAC), attributed lower numbers of males enrolled in university to declining application rates, but did not examine any underlying causes for those rates. Through examining data from EQAO, Klinger et al. (2009) have identified declining literacy rates for boys and young men as contributing to their diminished academic achievement and, thus, their reduced participation in postsecondary education. However, examining literacy is merely the first step in

understanding academic achievement and a more holistic approach is needed (Gosse & Arnocky, 2012).

A number of suggestions to improve academic performance, for both males and females, have been forwarded in the scholarly literature and the public press. Pedagogical changes, such as returning to greater emphasis on basic math skills and less on discovery or creative strategies, have been suggested (Alphonso, 2013; Alphonso & Maki, 2014; Clark, Kirschner, & Sweller, 2012; Keller, 2014; Macdonald, 2013, 2014; Mighton, 2013; Peritz, 2013, 2014). Others have proposed more radical structural changes such as the elimination of streaming (Rushowy, 2014a), or even the elimination of grade levels in high school (WGSI, 2013).

Before proceeding with such radical changes, smaller scale curriculum and/or policy changes should perhaps be explored. In Canada and the United States, character education has been explored as one strategy to teach children, both male and female, the merits of academic achievement (Ministry of Education, 2006; Ritchhart, 2002; Shields, 2011; Stiff-Williams, 2010). Character is defined by Lickona as “a reliable inner disposition to respond to situations in a morally good way, involving three interrelated parts: moral knowing, moral feeling, and moral behaviour” (as cited in Bajovic, Rizzo, & Engemann, 2009, p. 2), Lickona's definition narrows itself to moral underpinnings. However, Shields (2011) provides a more expansive understanding of character with his model that defines intellectual, performance, moral, and civic character. Such a model may provide the holistic approach sought by Gosse and Arnocky (2012).

All of the major studies cited above examined the academic performance and



enrolment decline issues using preexisting data sets, rather than drawing directly on the experiences of the participants themselves. Jacob (2002) analyzed data from the National Education Longitudinal Study of 1988 ([nces.ed.gov/surveys/nels88/](http://nces.ed.gov/surveys/nels88/)). Klinger et al. (2009), examined EQAO data from 2007. Card, Payne, and Sechel (2011) used data from the Ontario University Application Centre (OUAC). In addition to these studies being limited to secondary data, all were quantitative in one form or another. Furthermore, the cited studies may not reflect the lived experience of young men as they were rooted within the contexts of academia. However, as is described below, there is a dearth of literature exploring young men's own perceptions as to why they choose to engage in behaviours that might be considered “unhealthy” with respect to their academic performance.

### **Theoretical Framework for the Study**

Consensus in the literature about the role and place of theory in qualitative research is elusive (Anfara, 2008), varying amongst three schools of thought: (a) theory has little relationship to qualitative research; (b) theory relates to the methodology the researcher uses and the epistemologies that underly the chosen methodology; (c) theory has a pervasive role that affects all aspects of the research process (p. 870). Two aspects of the methodology selected for the study as described in detail in Chapter 3 would suggest that the role of theory would fall under the rubric of item (b). The use of the *verstehen* process of inquiry implied/inferred that a specific lens (i.e., critical theory, cultural studies models, constructivism, etc.) not be used so as to expose all possible aspects of the problem. Thematic narrative analysis avoided an interpretation of

participant responses and accepted those statements “at face value.”

In order to focus the study, the questioning of the participants centred on two major aspects of the young men's behaviour: their non-cognitive skills and behaviours associated with specific dimensions of character. Furthermore, the initial analysis of interview data exposed a third major category of behaviours, namely executive function, which was incorporated into subsequent analyses.

### **Central Phenomenon and Research Questions**

This study contributes to the literature by examining the perceptions of adolescent males and their parents as to the influences of noncognitive skills, character, and other factors on their academic performance. Semi-structured qualitative interviews were conducted, addressing the following research questions:

1. What factors do parents believe affect their sons' secondary school academic performance?
2. When they do, why do adolescent males choose behaviours that impede their academic achievement?

Several of this study's findings are believed to play a direct role in the decline of young men entering and/or completing postsecondary education. Foremost among them is the young men's difficulties with, and aversion to, mathematics. Proficiency with mathematics is a requirement to study the STEM disciplines—science, technology, engineering, and math—as well as business. All of these disciplines are at the heart of the knowledge-based economy. Another finding was that only one of the seven adolescent male participants was considering a career that would require a university degree. It is

understood that a 15-year old probably does not yet have a firm grasp on a future career, and that they are mostly following their passion, rather than making a considered choice. Yet not setting their sights on careers requiring advanced study will probably directly affect their secondary academic performance, and quite possibly prevent them from ever gaining entry into community college or university later in life.

Other findings were seen to have an indirect role in influencing their academic performance. The young men's noncognitive skills were examined in detail. Attentiveness in class was contingent on their interest in the subject, the instructional ability of the teacher, and the presence of their friends in the class. All of the young men were found to have weak time management/organizational skills. Most displayed varying degrees of unwillingness to ask for help with schoolwork or homework. All of the young men did, however, describe a facility and comfort with working in groups with their peers. This is very important, given the necessity of working in teams in the multidisciplinary modern workplace.

Another factor believed to affect their scholastic achievement is character, which was also explored in this study's participants. There is some cause for concern. The young men were not found to be overly curious about the natural world around them, nor were they strongly interested in their community. An interest in the natural world was seen by the researcher, based on personal experience, as an indicator of their predilection to study one of the STEM disciplines. Their lack of interest in the community may be due to several factors. All of the young men were involved in competitive sports year-round, not leaving much time for other activities or interests. Their community interest level may

also be the natural state of mind of many teenage boys. Many parents might strongly agree with that assessment.

Before concluding the chapter, some of the delimitations of the study—factors that may affect the study, but that are under the control of the researcher (Mauch & Park, 2003)—need to be discussed. To understand the adolescent male participants' academic performance, the young men were simply asked to qualitatively describe their general performance in school. They were also asked to identify their favourite and least favourite subjects and provide their perceptions for why they felt as they did regarding those subjects. However, no assessment of individual cognitive ability was performed at any time during the course of this study. Instead, they were asked how they were doing in school. Some of the young men gave specific averages while others categorized their performance as “failing” or “nearly failing.” There were several reasons for not delving too deep into specific academic marks. It was believed such assessments would be an intrusion on the goodwill and privacy of the participants who chose to take part in the research. Further, the researcher did not have the professional certifications necessary to administer educational tests or evaluate and interpret the results.

The area of thought under the rubric of “masculinities”—issues related to sexuality, social construction of gender, stereotypical behaviours, etc.—has intentionally not been considered. It was believed that the specific factors under study needed to be examined in isolation before accounting for this added context.

This chapter has presented an overview of factors that may affect young males' academic performance, the purpose of the study, brief discussions of the study's findings,

and the delimitations of the research.

Chapter 2 will provide the theoretical and research background on which the study's theoretical framework was built and a review of the literature on the theoretical domains impacting this study

Chapter 3 describes the research design, methodologies used, the intended study participants and their recruitment, data collection and analysis methods, and ethical considerations. A description of each of the participants is provided.

Dr. Michael Kompf's simple but elegant approach to reports documenting research and other forms of inquiry was summed up by him in three basic questions. "What?" describes the problem you are investigating or the results of inquiry. "So what?" begs the author/researcher/inquirer to describe the importance of the problem and/or results, and, "What next?" describes follow-on work, whether that be action to redress the problem under study or the need for new research exposed by a study.

Chapter 4 presents the results of the qualitative data analysis for the parent and adolescent male interviews.

Chapter 5 is divided into three parts. The first part discusses the study's results in greater detail. The second part links the results to the academic literature and the public press to focus on school reform. The final part is a proposed framework for improving non-cognitive skills and building character by boosting executive function. This process is mediated by project management theory and practice, with the goal of increasing the young men's academic performance.

Chapter 6 provides a number of conclusions about the study, as well as suggesting

future studies to expand on the findings of this research or examine topics specifically left out.

## **CHAPTER TWO: REVIEW OF THE LITERATURE**

This chapter introduces a number of fields of thought that impact the dual problem of the academic performance of adolescent males and how that performance affects their probability of entering and completing studies in tertiary education. The first section presents the methodology for the literature review itself. That methodology is described using a traceability model, a construct developed specifically for this study. The text in this chapter is taken directly from the full traceability model narrative which is included as Appendix H. From there, the research problem is elaborated based on a number of statistics from specific sources: Statistics Canada, the Organisation for Economic Co-operation and Development (OECD), and the Conference Board of Canada.

Several aspects of philosophy are presented as part of the theoretical underpinnings of the study. Strategic essentialism provides a comprehensive lens through which a heterogeneous group—in this case, Canadian boys—is examined as a single entity. Later in the chapter, there is a short section on perception. The discussion there is narrowed to how the perceptions of the adolescent male participants and their parents might affect the validity and reliability of the study.

The section of contributing factors presents three categories of behaviors believed to affect young men's academic performance: executive functions are cognitive processes that serve ongoing, goal-directed behaviors; character is making good practical choices depending as little as possible on contingent external factors; and, noncognitive skills—sometimes referred to as soft skills— which are desirable qualities that do not depend on

acquired knowledge. The section on educating boys presents several factors from the education system that have been identified as potential contributors to boys' and young men's academic performance, including: curriculum, pedagogy, learning environments, literacy, and numeracy. Next, different aspects of the minds of boys are examined.

Cognition looks at the mental processes of learning, especially the transfer of information from working memory to long-term memory. Recent advances in brain imagery have allowed scientists to better understand how the brain is constructed, how it functions, and identified material sex-based differences in structure and function. The final section of the chapter presents background material on project management theory and practice, which will be used to suggest a framework for teaching noncognitive skills, character, and executive function.

### **Literature Review Methodology**

A dissertation must present the logical progression of a research study from the inception of the problem to the discussion of the study's results (J. Engemann, personal communication, 9 December 2013). To ensure this document conforms to that guideline, a *traceability model* was developed. Traceability is “the ability to trace (identify and measure) all the stages that led to a particular point in a process that consists of a chain of interrelated events” (traceability, 2013). In software engineering, it is a system that tracks all work on a given project back to the original or subsequent requirements that reflect changes agreed to by all parties. It is a quality assurance method whose purpose is to ensure that implementation of all requirements is included, but only those requirements. Traceability is also a quality assurance tool that helps assure internal consistency.



Qualitative social sciences research, by its circuitous nature, is not a straightforward process like software development often is. Nonetheless, each aspect of a research study must be traceable back to the stated purpose of the study. The traceability model developed for this study attempts to provide such a reckoning. The full model is included as Appendix H. The initial segments of the model pertaining to the development of the problem being studied and literature review are repeated below.

This study uses Literature and Theory Maps, constructs developed by the researcher as an extension to literature maps presented by Creswell (2009), to illustrate connections between theory and the literature in a graphical form. The graphical representations use the Unified Modeling Language (UML). The UML was originally developed for software engineering 20 years ago, but has since been extended to model computer networks, business processes, and many other types of systems. It has been used here to model only structure. Although the UML can model behaviour, it has not been tested to determine if it is ontologically correct to do so. A quick reference guide to the UML can be found in Appendix A.

### **Literature Traceability**

Verstehen—described in detail in Chapter 3—played a pivotal role from the outset of this research. Further, the research design followed an iterative-incremental sequence, where the need for additional supplemental reviews of the literature were required with each iteration of the study.

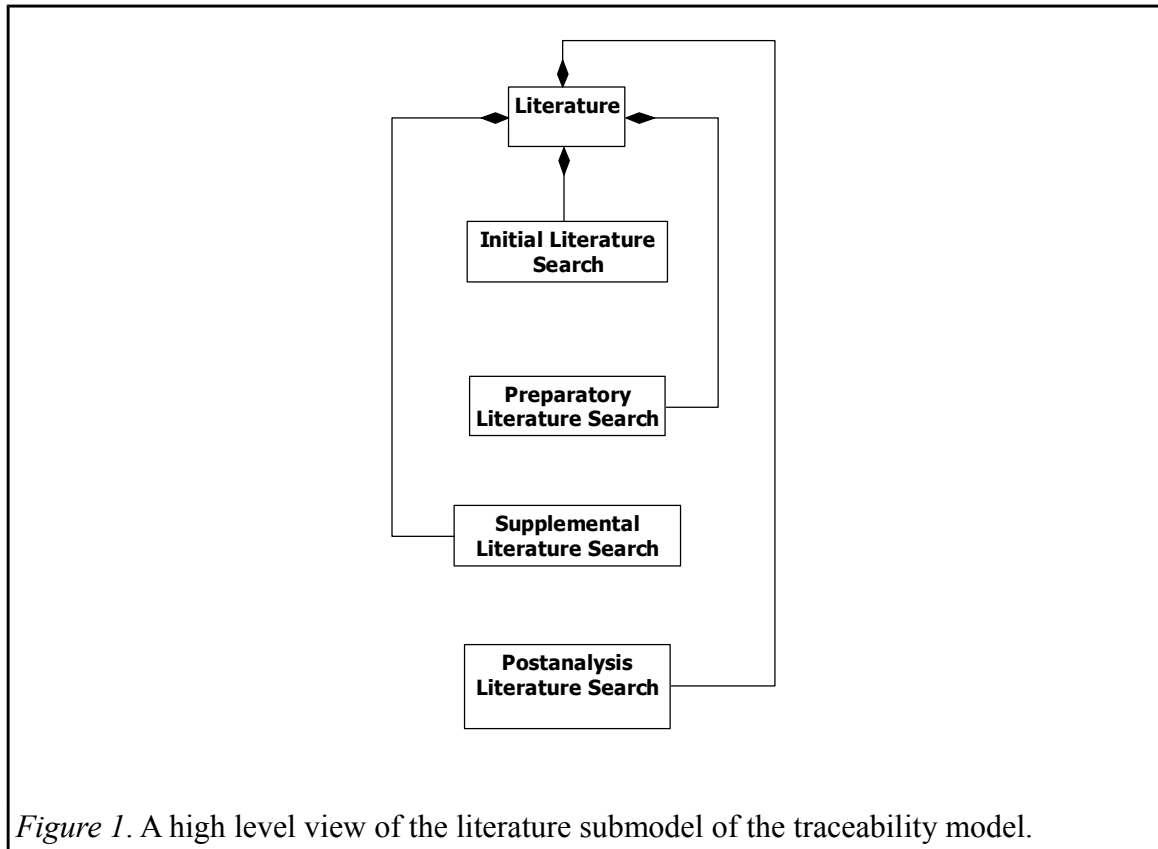
**Literature review.** The literature search activities were a major component of the verstehen discovery process used in the study. A high level view of the literature

submodel shows that some form of literature review was performed at four different stages of the study: the initial review to identify the research problem; the preparatory literature review, conducted for the research proposal, which assisted in developing the research questions; the supplemental literature search, which provided background on new issues exposed in the exploratory interview with one of the participants; and, supplemental literature search to provide support for issues arising from the data analysis and for potential strategies suggested to mitigate some of the study's findings. Figure 1 shows the high level structure of the literature reviews. Figure 2 illustrates detailed results of those searches.

### **The Problem**

The general overtones of the research topic arose as a result of discussions with Dr. Michael Kompf in preparing my application to the Joint PhD program in Education. His suggestion was to find a topic that the university might find compelling, such as a means to increase enrolment and, thereby, revenues. An initial literature review showed that a reversal of the decline in males enrolling in postsecondary education could represent such a new source of enrolments.

If an increase in male university enrolments took place in a vacuum, there would be no need to consider possible or real consequences, unintended or not. However, it is recognized that increases in male attendance in postsecondary education with the system's currently dominant bricks-and-mortar limitations of a fixed number of places, a very real possibility exists that many of the gains made by females, visible minorities, and other cultural groups would be eroded. Thus, any recommendations arising from this



*Figure 1.* A high level view of the literature submodel of the traceability model.

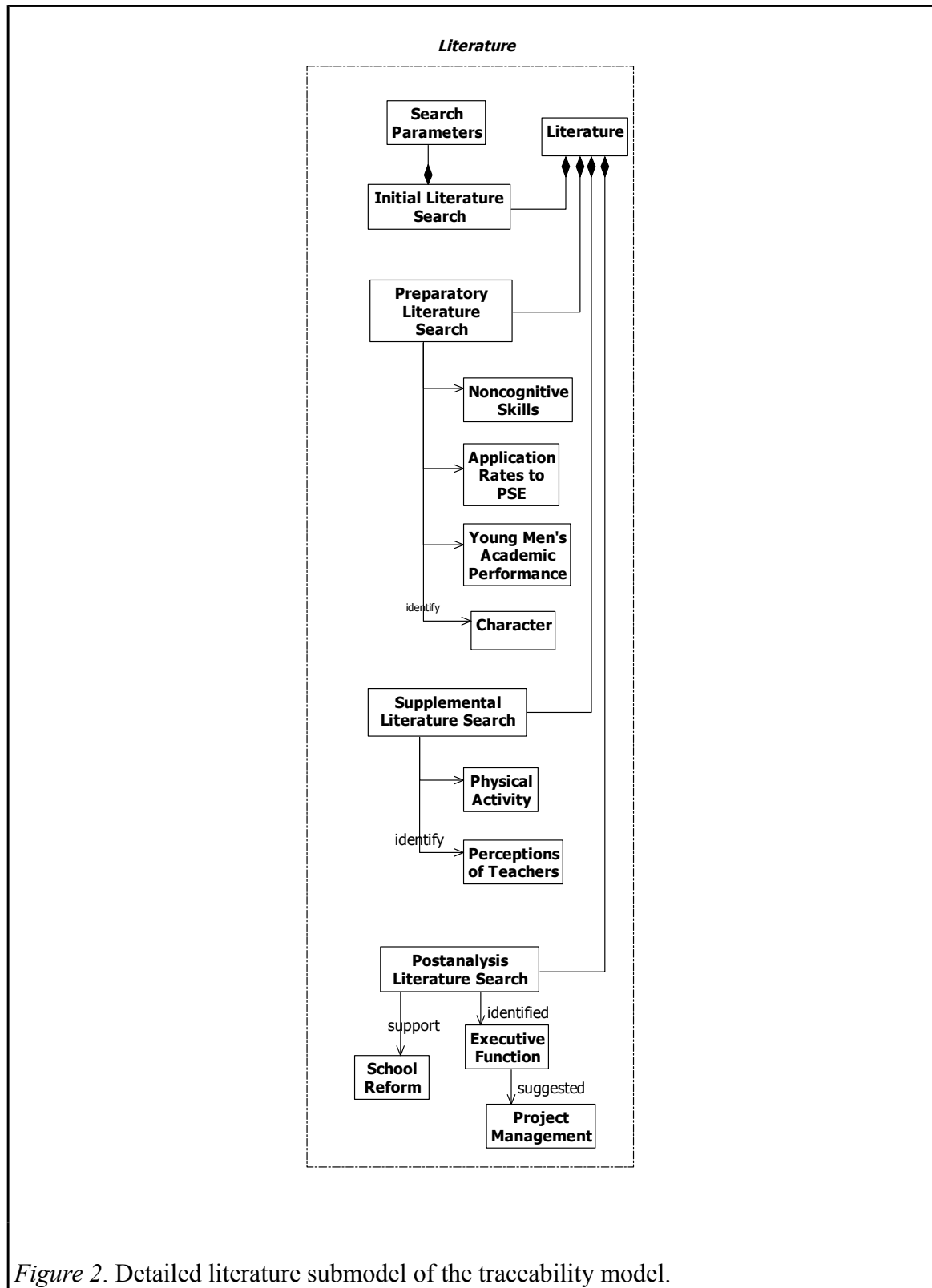


Figure 2. Detailed literature submodel of the traceability model.

study must maintain or ideally also improve upon the status quo for these groups and still find ways to make room for more males.

### **Academic Performance of Boys and Young Men**

Academic performance is measured either through standardized tests and other assessments or through school grades and report cards (Buchmann, DiPrete, & McDaniel, 2007). Furthermore, school grades are the predominant factor for acceptance into tertiary education. (Evers et al., 2006). Thus, it is young men's academic performance and achievement that must first be examined to understand the decline in enrolments.

The “boy crisis” was first described in the public press in a Newsweek article by Tyre that declared “by almost every benchmark, boys across the [U.S.] and in every demographic group are falling behind” ( as cited in Resnick, 2014, p. 1). However, Voyer and Voyer (2014) report this is not a new phenomenon. Their study, a meta-analysis of 360 previous studies selected from over 15,000 candidate studies dated between 1914 and 2011, shows evidence of low scholastic achievement in boys and young men for a century.

As previously mentioned, boys' and young men's results on standardized tests are significantly higher than their performance at school. One reason for this discrepancy may be that school marks reflect learning in the larger social context of the classroom requiring sustained effort and persistence, whereas standardized tests assess abilities and aptitudes at one moment in time. In fact, the symptoms that gave rise to the declaration of the boy crisis have been under study for a century, starting in 1914 (Voyer & Voyer, 2014); however, even though the perceived crisis may not be new, boys' academic

performance must still be addressed given the importance of grades on future success (Anderssen, 2014; Resnick, 2014).

### **Decline in Postsecondary Enrolments of Young Males**

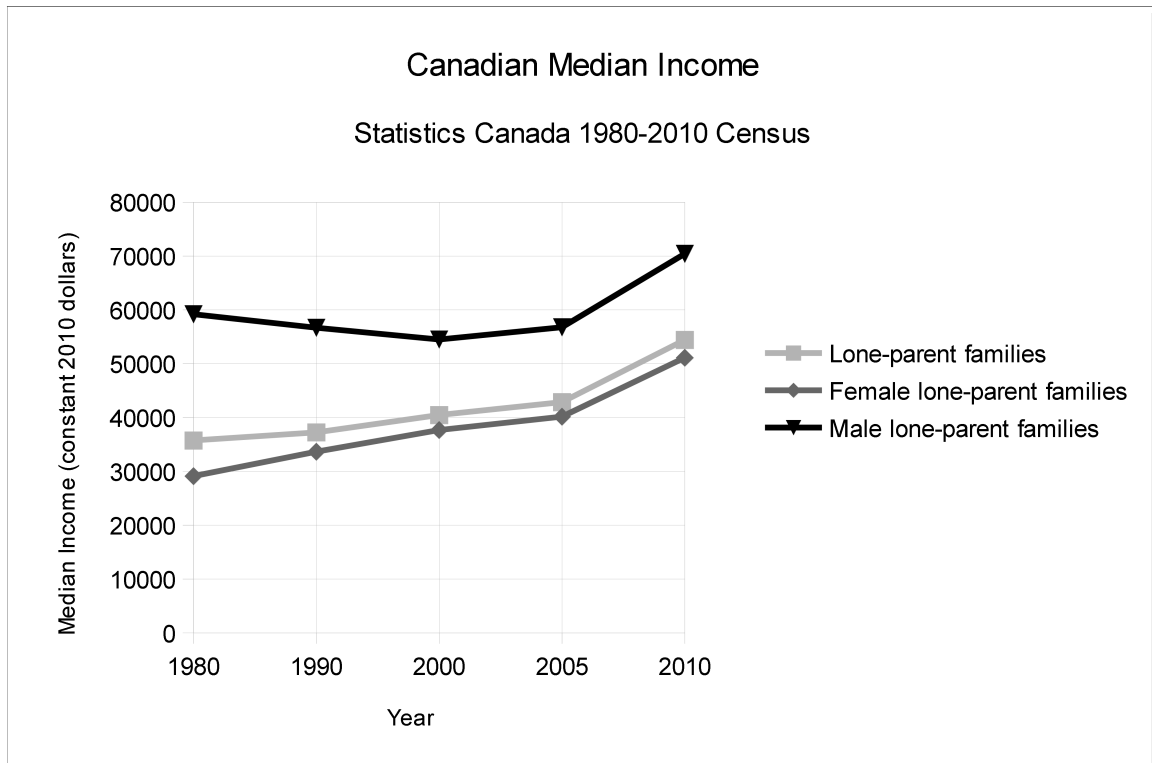
The decline in enrolments of males in colleges, but especially universities, forms part of the rationale for conducting this study. The phenomenon, often referred to in scholarly works and the public press as the gender imbalance, is not recent. The last time female to male enrolment ratios were relatively evenly split was in the early- to mid-1980s (Card, Payne, & Sechel, 2011; Intini, 2006). The gap has widened to such a degree that in 2006, 41% of Canadian undergraduates were men. Some disciplines have even lower ratios: 32% in social sciences and 17% in English. In 2006, at the University of Guelph, males represented 33% of enrolments (Evers et al., 2006, p. 1). Professional programs, traditionally male bastions are seeing similar trends: In recent years, 41% of medical school and 47% of law school graduates are male (Intini, 2006). Data from Statistics Canada's 2011 National Household Survey on postsecondary enrolments and graduation rates—the results of which are included in Appendix B—show that those frequencies have held or been reduced further with respect to males. What is new, confirming the enrolments trends, is that for the first time males are now outnumbered in business programs (Statistics Canada, 2013b; see Table B2). Males dominate enrolments in relatively few fields, such as: mathematics and computer science (75.7%); engineering and architecture (81.7%).

There is cause for concern because, as Card et al. (2011) suggest, the long term earnings potential of a growing number of half the population (i.e., males) could be

materially reduced. Examining data from the Canadian 2006 census points to such a trend. In 1980, the median income of all females with university degrees was 65% of the median income of all males with a university degree. In 2005, the median income of females with university degrees was 71% of the median income of males with university degrees (Statistics Canada, 2009a). These figures suggest that a simple reversal of earnings by females will not accompany their ever greater participation in the white-collar/professional workforce.

To examine this phenomenon closer, the median income for single-parent families was examined. These families were chosen because they were seen as the least affected by any extraneous gender factors. Looking at income regardless of family structure may have introduced an additional variables. In reviewing the data for all lone-parent families, the female to male median income ratio rose from 54% in 1980 to 71% in 2005 (Statistics Canada, 2009b). In the most recent census, the female to male ratio was 73%, indicating that females' incomes are not rising sufficiently to close the gap with males in the near- or medium-term. Despite the narrowing of the income gap over the period, female lone-parent families' median income was still only 73% of male lone-parent families. Figure 3 illustrates these trends.

From a purely macroeconomic perspective, there are further troubling trends. Between 1980 and 2000, the gap narrowed by an average of 3% per year; from 2000 to 2005, the gap narrowed by only 0.4% per year, signaling a slowing or a possible stagnation of the closing of the income gap. The results from the 2011 census show that a stagnation has indeed taken hold. Figure 3 shows the medium incomes for lone parent



*Figure 3.* Medium incomes of lone parent families over the period 1980-2010. Figures for 1980-2005 are from Statistics Canada (2009b). Those values were converted to 2010 equivalents using the Bank of Canada's online inflation calculator (<http://www.bankofcanada.ca/rates/related/inflation-calculator/>). The 2010 values were retrieved from Statistics Canada (2013g).



families over the period 1980 to 2010. What these data show is that role reversals of traditional primary income earners from males to females will not translate into a zero-sum result in median incomes. As the proportion of males with university degrees declines, so will the overall median family income. The most likely outcome is a reduction of disposable income for all wage earners, male and female, translating into a material reduction in the standard of living for everyone. A 2011 report for the Brookings Institution has shown that this decline is, in fact, now taking place in the United States. “The annual earnings of the median prime-aged male—aged 25-64—in the United States has actually fallen by 28 percent” (Greenstone & Looney, 2011, p. 1).

### **Strategic Essentialism**

This study examined the lot of young males, delving into a number of complex issues regarding Canadian boys, a very heterogeneous group. One pitfall of using such a wide brush—all Canadian boys—is that individual needs and circumstances are overlooked. However, to enable researchers to begin to study such complex groups, at the very least, strategic essentialism provides “a more comprehensive lens through which to examine what is indeed a heterogeneous group, with varied identities affiliated to intersections of race, class, gender, sexual orientation, disability, geographical location, and language and culture” (Gosse & Arnocky, 2012, para. 3).

Essentialism is the philosophical doctrine that certain properties of an object or a concept are necessary or essential, rather than contingent or accidental. Essentialists maintain, first, that all objects and concepts can be defined by reference to certain core properties that make them what they are. Aristotle claimed that all things have their

essences, are defined as “those properties that make the thing what it is, and without which it would not be that kind of thing” (Janicki, 2003, pp. 274-275). “In humanist thought, without that essence, the unique and unchanging core that guarantees the [object] its meaning, the [object] would cease to exist” (St. Pierre, 2011, p. 616).

Gayatri Spivak's “strategic essentialism” refers to “the ways in which...social groups may temporarily put aside local differences in order to forge a sense of collective identity” (Dourish, n.d., p. 1). It is a “strategic use of positivist essentialism in a scrupulously visible political interest” (Fuss 1994, p. 99). It utilizes the idea of “essence with a recognition, and critique, of the essentialist nature of the essence itself. It is a means of using group identity as a basis of struggle, while also debating issues related to group identity within the group” (Wolff, 2007).

### **Contributing Factors**

Many studies of the decline in male postsecondary enrolments have examined noncognitive skills as a major contributor to that decline (Evers et al., 2006; Farrington et al., 2012; Jacob, 2002; McClelland, Morrison, & Holmes, 2000). Less studied potential contributors are the areas of thought around character and executive function. This section examines the literature on these factors.

### **Executive Function**

Before looking at noncognitive skills or character, executive function, which might be thought of as the building blocks of some noncognitive skills or dimensions of character needs to be explored. Executive function is a neuropsychological concept for the cognitive processes that serve ongoing, goal-directed behaviors (Dawson & Guare,

2010; Meltzer, 2007). To date, executive function has not been a part of the discourse around boys' and young men's academic performance as it might relate to participation in postsecondary education. Notably, its importance and relevance to this study only arose in response to the study's results.

Until the late 2000s, studies of executive function have been “the domain of neurologists and neuropsychologists, emphasizing the prefrontal cortex [of the brain] as controlling” executive function processes (Meltzer, 2010, p. 4). More recently, “educators have begun to recognize the importance of executive function processes for educational performance” (p. 4). Weaknesses in executive function “can have a significant impact on the accuracy and efficiency of students' performance” (p. 6).

The following elements are included in those behaviours: “goal setting and planning; organization of behaviours over time; flexibility; attention and memory systems that guide these processes (e.g., working memory); and, self-regulatory processes such as self-monitoring” (Meltzer, 2007, pp. 1-2). Executive function regulates behavioural processes in the “establishment of clear goals, the requisite abilities and techniques for attaining that goal, and the volition to begin and persevere until the goal has been reached” (Moran & Gardner, 2007, p. 20). Table 1 lists the executive functions and their descriptions, developed through the work of Guare, Dawson, & Guare (2013, pp. 15-17).

### **Character**

In the early planning stages for this research, Dr. Michael Kompf suggested that character education be examined to explore its suitability in examining academic performance of adolescent males. However, before looking at the larger role character

Table 1

*Definitions of Executive Skills*

Executive Skill*	Definition*
Cognitive Skills**	
Working memory	The ability to hold information in memory while performing complex tasks. It incorporates the ability to draw on past learning or experience to apply to the situation at hand or to project into the future.
Planning/ prioritization	The ability to create a road map to reach a goal or to complete a task. It also involves being able to make decisions about what is important to focus on and what is not important.
Organization	The ability to create and maintain systems to keep track of information or materials.
Time management	The capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines. It also involves a sense that time is important.
Metacognition	The ability to stand back and take a bird's-eye view of oneself in a situation, to observe how one problem-solves. It also includes self-monitoring and self-evaluative skills.
Behavioural Skills**	
Response inhibition	The capacity to think before you acting—this ability to resist the urge to say or do something allows a child the time to evaluate the situation and how his or her behaviour might impact it.
Emotional control	The ability to manage emotions to achieve goals, complete tasks, or control and direct behavior.
Sustained attention	The capacity to keep paying attention to a situation or task in spite of distractibility, fatigue, or boredom.
Task initiation	The ability to begin projects without undue procrastination, in an efficient or timely fashion.
Goal-directed persistence	The capacity to have a goal, follow through to the completion of that goal, and not be put off or distracted by competing interests.
Flexibility	The ability to revise plans in the face of obstacles, setbacks, new information, or mistakes. It relates to an adaptability to changing conditions.

\* Adapted from Guare, Dawson, Guare (2013, pp. 15-17)

\*\* Adapted from Guare, Dawson, Guare (2013, p. 19)

education might play in scholastic achievement, an understanding of character itself was needed. That examination determined that character could indeed be a major factor in boys' scholastic achievement (Tierney, 2012d). The following discussion of character is presented to establish a better understanding of its role.

Character is being “firmly secured in one’s own individual constitution, in such a way that one’s reliability in making good practical choices depends as little as possible on contingent external factors” (Merrit cited in Pamental, 2010, p. 149). Many would consider moral fortitude, with its basis in religious or philosophical traditions as the cornerstone of character education. Indeed, Lickona defined character as “a reliable inner disposition to respond to situations in a morally good way, involving three interrelated parts: moral knowing, moral feeling, and moral behaviour” (as cited in Bajovic et al., 2009, p. 2). However, Shields (2011) offers a model of character composed of four more broadly defined elements: intellectual, moral, civic, and performance character.

**Intellectual Character.** Intellectual character (IC) is “the overarching conglomeration of habits of mind, patterns of thought, and general dispositions toward thinking that not only direct but also motivate one’s thinking-oriented pursuits” Ritchhart (2002, xxii). Ritchhart identified six dispositions as central to IC. *Curiosity* involves “finding the interesting and puzzling in the everyday, the mundane, and the ordinary.” It acts as the “engine for thinking”, fueling interest and thereby generating questions and posing problems (p. 28). *Open-mindedness* works against narrowness and rigidity, countering the tendency to accept things as they come instead of challenging things the way they are (p. 27). *Metacognition* is the thinking about thinking. Effective learners who

engage in reflexive, metacognitive practices tend to “actively monitor, regulate, evaluate, and direct their thinking” (p. 28). It replaces a laissez-faire approach to thinking and problem solving wherein one organizes and directs those endeavors. Being *strategic* is to be “planful, anticipatory, methodical, and careful in our thinking, [devising] plans of attack setting goals...Being strategic is...a move toward efficiency.” (p. 30). Being *skeptical* is the essence of critical inquiry, accepting nothing at face value, “probing below the surface of things, looking for proof and evidence. [It] allows [one] to follow others' reasoning and examine it carefully [allowing one to] be critically discerning consumers of ideas” (p. 30). *Truth-seeking* “must be developed actively through certain mental moves, one of which is reasoning based on the evidence one is able to uncover” (p. 29). In order to help students develop such understanding, Ritchhart suggests that, instead of asking students for their opinions, beliefs, and ideas on a topic, they should be asked why they hold such beliefs.

According to Shields (2011), teaching and assessment of learning which tend to emphasize memorization needs to give way to the teaching of IC if we are to be truly successful at teaching higher modes of learning. Focusing on IC provides three key advantages: “growth in intellectual character will tend to generalize across domains in ways that specific content learning will not; developing the dispositions of intellectual character will...provide a foundation for a lifetime of intellectual adventure; make it clear *why* students should be in school” (p. 50; italics in original).

**Moral Character.** Moral character often lies at the heart of education proffered by religious institutions and organizations. However, de Botton (2012), an ardent atheist,

proposes that faith traditions can be distilled from their metaphysical aspects to teach “the need to live together in communities of harmony, despite our deeply rooted selfish and violent impulses” (p. 12). Moral character reflects a disposition to seek the good and right. It is rooted in a basic desire for goodness. In situations of choice and conflict, the person of moral character gives priority to moral over non-moral considerations. “The goal [of character education] is to develop a disposition to seek goodness, not inculcate a specific list of preferred virtues” (Shields, 2011, p. 50).

Damon (2010, p. 37) believes that morality is a natural part of the human system and that every child begins life with the rudimentary building blocks of character. He cites numerous studies which have identified four such blocks. *Empathy* is the capacity to experience another’s pleasure or pain, providing the foundation for caring and compassion. Fairness emerges soon after children begin playing with friends. Evidence of the development of fairness is the oft-heard exclamation, “That’s not fair!”. “*Self-control* can be seen in an infant’s eagerness to regularize behavior through repetition, rituals, and rules. *Obligation* expresses itself in children’s wishes to follow the directives and expectations of their caregivers” (p. 37; italics added).

**Civic Character.** “[C]itizenship is not simply a passive state of entitlements. [It] is one of the fundamental roles to be learned by men and women as they deliberate with one another about matters pertaining to the public good” (Welton, 2005, p. 150). Shields (2011) relates that, quite different from its current meaning, *idiots* were people who were uninvolved in their community, self-absorbed, seeking only their own personal good, and did not participate actively in the cultural or political institutions of the nation. Shields

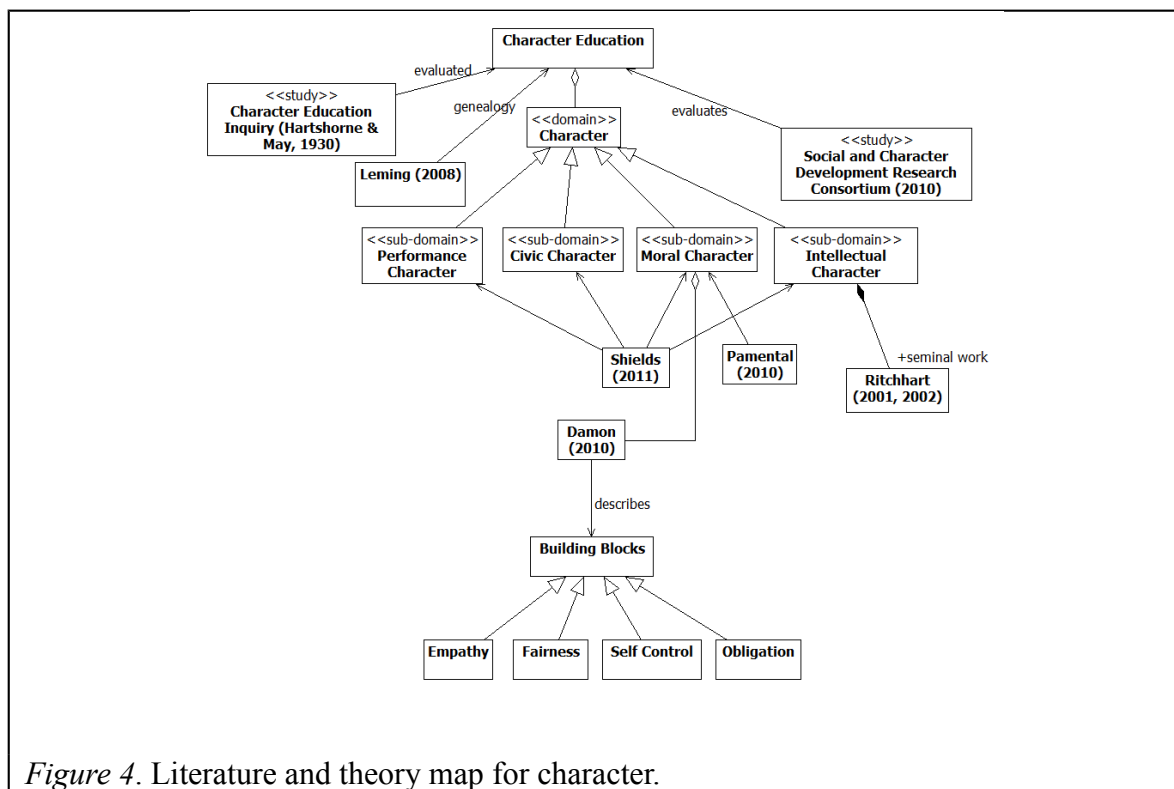
also believes that passion for the public good is the heart of what we call civic character and that the need to develop civic character was a prime motive for establishing public education (p. 51). Furthermore, Oakes et al. argue society has a right to expect that its public schools will graduate students who can effectively participate in civic life and shape the common good, guided by principles of social justice and an ethic of care (as cited in Shields, 2011, p. 52).

**Performance Character.** Performance character refers to the dispositions, virtues, or personal qualities that enable an individual to accomplish intentions and goals....It includes such qualities as perseverance, diligence, courage, resilience, optimism, initiative, and attention to detail...These performance virtues lead to high-quality effort and work. Those with well-developed performance character take pride in what they do and seek to make it the best that it can be. (Shields, 2011, p. 52)

One aspect of performance character is the quality of work done by the individual, which is influenced by many factors including skills, presence or absence of a supportive environment and values such as diligence, preparation, and the commitment to the best work one can do (Character Education Partnership, 2008). Here, work is taken as broadly to mean how one affects the lives of others: when work is done well, others usually benefit; when it is done poorly, someone suffers (p. 2). The attributes of performance character—effort, initiative, diligence, self-discipline, and perseverance—are coupled with moral character, ensuring that one's work benefits others and is done in pursuit of ethical goals (p. 3).

Figure 4 shows the literature and theory map for character, based primarily on





Shields's model. The following section discusses several approaches for teaching character.

**Teaching character.** Character education can have a multitude of nuanced interpretations. Some might see it as a vehicle for teaching citizenship and patriotism. Still others might see it as enhancing resilience to withstand the vicissitudes of everyday life. Shields (2011) proposes a definition that is more encompassing: teaching individuals to be “competent, ethical, engaged and effective member[s] of society” (p. 49). He further poses the question “Isn't that what we want from our education system?” (p. 49). One must assume that the answer to this, possibly rhetorical, question is “yes”. Character education is now seen as “an umbrella term loosely used to describe the teaching of children in a manner that will help them develop variously as moral, civic, good, mannered, behaved, non-bullying, healthy, critical, successful, traditional, compliant and/or socially acceptable beings” (Character education, 2012).

Informal cultural forms of character education have been part of the human condition since humans have existed. However, in the context of being part of universal education systems, it is less than two hundred years old with three distinct periods in the British and North American contexts.

***Muscular Christianity.*** As will be seen in later chapters, the young men interviewed for this study were all involved in competitive sports year-round, despite, in some cases, such participation negatively influencing their academic performance. Some of the young men perceived athletic prowess as a substitute for scholastic achievement. Such attitudes toward athleticism are not new. The term “muscular Christianity” first

appeared in a book by Charles Kingsley in 1857 (Zipes, Paul, Vallone, Hunt, & Avery, 2005, p. 1834). In the book *Tom Brown's Schooldays* (1857), Thomas Hughes espoused that “the years from ten to eighteen are the most important in a boys life”, believing that careful attention to these years were essential for the good of the nation's (i.e., England's) emotional and spiritual health (p. 1833). The essence of English manliness and Christian moral courage is found in the games, camaraderie, and insularity of the public school—costly boarding schools.

During the late 19th century in the U.S., Christian churches had become strongly associated with women and feminization, which in turn became synonymous with liberalism and modernity. Fundamentalist men began seeking changes in the nature of Christianity and Christian churches which reflected “masculine” values. This early form of Muscular Christianity used sport as a conveyor of moral values, like manliness and discipline. Evangelical Christians have since used high school and college sports to promote Christianity (Cline, n.d.). The retaking of Christian churches also resulted in the diminishment and subjugation of women. The inferior roles for women has carried forward, remaining part of the social hierarchy espoused in modern character education curricula in several deep south U.S. states (Smagorinsky & Taxel, 2004, p. 120).

***The U.S. in the early 20<sup>th</sup> century.*** The most significant event for character education in the U.S. in the early 20<sup>th</sup> century was the Character Education Inquiry (CEI), conducted during the period 1928-1930. The report, authored by Hugh Hartshorne and Mark May, had a substantial impact on the character education movement following its release. Power, Higgins, and Kohlberg argue that:

From a research perspective the death blow to character education was delivered by Hartshorne and May's famous research on character...its effect was to debunk the very notion of character itself, thereby pulling the rug out from under the educators (as cited in Leming, 2008, p. 18).

At the time the report was released, "many influential educational theorists and school leaders understood tradition to be an inadequate guide for the development of contemporary life and educational practice...tradition and religion were declining and would contribute less and less to informing the practices of education" (Leming, 2004, p. 21).

Amongst educators, the character education discussion became one of determining the best approach to teach character. According to Smith, the *direct* form was understood as "the use of definite times, places, and materials for giving specific instruction in morals and manners, ethics, religion" (as cited in Leming, 2004, p. 21). While Smith saw the indirect approach as "the attempt to affect character by environment, activities" (as cited Leming, 2004, p. 22). The belief among scholars was that the indirect approach was preferable (Leming, 2004, p. 22): "preaching and moralizing on the part of the teacher were to be avoided; instead, "Students were asked to locate the moral lesson for themselves" (p. 23).

***Character education in the 21<sup>st</sup> century.*** Presidential candidate George W. Bush offered the view that character education should be included in schools and that the funding for this education should be greatly expanded so that "public schools will teach children values, values which have stood the test of time" (Smagorinsky & Taxel, 2004,

p. 113). The previous Clinton administration had begun such expanded funding in 1996 and, once in office, Bush's administration continued this strategy until the adoption of the No Child Left Behind Program.

The Ontario Ministry of Education launched the Character Development Initiative (CDI) in 2006. In a 2008 memorandum (Marshall, 2008), the Deputy Minister stated that the CDI

recognizes that learning, academic achievement, respect for diversity, citizenship development, and parent and community partnerships are inextricably linked and must be interwoven into students' educational experiences. It provides students with tools for increasing academic achievement, building a solid foundation for thoughtful decision-making and creating more opportunities to use their skills to influence positive outcomes. Ultimately, we want our students to think critically, feel deeply and act wisely (Marshall, 2008, p. 2).

Ontario's CDI set forth a framework of key beliefs and principles, some of which also strongly align with Shields' (2011) model of character.

Character development is a primary responsibility of parents and families; a cornerstone of a civil, just, and democratic society; a foundation of [the] publicly funded education system....[It] supports student achievement because it develops the whole student as an individual, as an engaged learner and as a citizen...[and it] sets high expectations for learning and behaviour and engages students in sharing the responsibility for their own learning....Character development strives for an ever-growing depth of self-awareness, reflection and understanding. (Ontario

Ministry of Education, 2008, pp. 5-6)

### **Noncognitive Skills**

Noncognitive skills are desirable qualities that do not depend on acquired knowledge. They are sometimes referred to as “soft skills.” Such skills increase the likelihood of getting good grades and, in turn, the likelihood of meeting the academic admission requirements for tertiary education (Cornwell et al., 2012; Evers et al., 2006).

Jacob's (2002) oft-cited study—272 times in Google Scholar alone—used data from the 1988 U. S. National Educational Longitudinal Survey of a nationally representative cohort of eighth grade students. Jacob examined the contribution of two factors—the influence of post secondary education on income (i.e., increased wages due to post secondary attainment), and the influence of noncognitive skills on the decline in male enrolments. In order to isolate the contributions of the college premium and control for, or otherwise limit the effects of, the myriad other socioeconomic, demographic, cultural and other dimensions of the participants, Jacob developed a mathematical model. He estimated the earnings for males and females over a defined period beyond high school graduation, for both those participants who entered the workforce immediately upon graduation and those who completed a postsecondary degree. The researcher then applied net present value (NPV) calculations to the income estimates to allow comparison of the “present value of money to the present value of money in future, taking inflation and returns into account” (net present value, 2012). In basing the college premium calculation, in part, on earnings values adjusted for NPV, the researcher also controlled for future inflation. Although future inflation rates were estimates, inflation has

consistently been below 5% since 2000. Jacob also developed a linear probability model—a special case of a binomial regression model where the observed variable for each observation takes values which are either 0 or 1—for use in a multiple regression analysis to estimate the probability a given individual would attend a postsecondary institution. He combined this with a series of thirty seven covariates to account for noncognitive skills.

A major conclusion of Jacob's study was that “[t]he effect of noncognitive skills is comparable in magnitude to socioeconomic status and cognitive ability. Given the importance in [university] attendance decisions, it is likely that noncognitive factors influence employment, occupation choice, and a variety of other labour market outcomes” (p. 597).

The noncognitive skills examined by this study were stated explicitly in Evers et al. (2006) and Jacob (2002). They are: attentiveness in class, willingness to ask for help, time management/organizational skills, and ability to work with others. An elaboration of each follows.

**Attentiveness in class.** Guare et al. (2013) associate this skill with the executive function of sustained attention. They describe sustained attention as the ability to “maintain attention in class, stick with homework, and complete chores” (p. 188). It is “the capacity to keep paying attention [in class] in despite distractibility, fatigue, or boredom” (p. 15). Not paying attention in class *may* result in failing to learn required content, missing important requirements for schoolwork and homework, or failing to understand how their work might affect that of other students, particularly in group work.

**Time management/organizational skills.** Time management has been identified as not only a necessary skill for school, but a necessary life skill (Byrne, 2010). It includes such activities as getting work done on time, scheduling events, allocating sufficient time and resources, and being punctual (p. 5). It also represents a complex combination of a number of executive functions (i.e., task initiation, organization, goal-directed persistence, planning/prioritization, metacognition, and the time management executive function).

**Willingness to ask for help.** Evers et al. (2006) and Jacob (2002) both identify the willingness to ask for help as a specific noncognitive skill, but fail to define it or provide a discussion as to its influence on academic achievement. But such a willingness, to get help from another when one is unable to proceed with schoolwork or homework, is fundamental to learning, especially when content familiarity plays such an important role in students' academic performance.

Logic would dictate that the willingness to ask for help would be predicated on an individual's performance character, influencing the quality of work done and the commitment to the best work one can do (Character Education Partnership, 2008). Empathy may also play a role: when work is done well, others usually benefit; when it is done poorly, someone suffers (p. 2).

**Ability to work with others and in groups.** Evers et al. (2006) and Jacob (2002) also do not discuss the importance and impact of young men's ability to work with others or in groups. UNESCO suggests a life skill that could help fill in this gap, recommending *learning to live together* as a necessary life skill, which includes



first, communication skills such as verbal and nonverbal communication, active listening, and giving and receiving feedback. Second, it includes negotiation skills, such as the ability to negotiate, assertiveness, receiving feedback, and the ability to say “no.” Third, it includes empathy and the ability to understand others' needs and circumstances. Fourth, it involves teamwork, the ability to work in a group, to assess the contributions of others as well as one's own contributions, and to respect others. And, finally, it includes advocacy skills, which involve motivation, persuasion, and influencing skills. (Byrne, 2010, p. 2)

Byrne (2010) also suggested a number of necessary life skills for the 21<sup>st</sup> century based on project management theory and practice, detailed in a subsequent section of this chapter. In particular, he identifies *teamwork, cooperation, and collaboration* as those skills. He suggests that such abilities “make students...a success or failure faster than any other single set of skills” (p. 5).

**Studies on noncognitive skills and academic achievement.** Several studies have examined noncognitive skills and their effect on academic achievement. Jacob's (2002) study determined noncognitive skills do indeed influence academic performance and a student's eventual admission to a higher learning institution. He used data from the National Educational Longitudinal Survey (1988) as a secondary source. The magnitude of that influence was found comparable to socioeconomic factors (p. 597).

Cornwell et al. (2012) studied the effects of noncognitive skills and gender disparities in the test scores and teacher assessments of primary students. Data from the Early Childhood Longitudinal program (ECLS) were used. Their study was based on data

from the 1998-99 ECLS cohort administered by the National Center for Education Statistics (NCES). In that study, teachers

rated their children along several dimensions of classroom behavior that reflect noncognitive skills. For example, teachers reported how well each child was engaged in the classroom, how often the child externalized or internalized problems, how often the child lost control, and how well the child developed interpersonal skills. NCES combined the answers to such questions to create... a *social rating scale* (SRS) for measuring *approaches to learning*, *self-control*, *internalizing problems*, *externalizing problems*, and *interpersonal skills*.

(Cornwell et al., 2012, p. 241; italics added)

Cornwell et al. focused on approaches to learning as a measure of noncognitive skills (p. 241). They concluded that “boys who perform equally as well as girls on reading, math, and science tests are graded less favourably by their teachers, but this less favourable treatment essentially vanishes when noncognitive skills are taken into account” (p. 236). Both of these quantitative studies' data sources were repurposed from their original studies.

### **Educating Boys**

Several factors from the education system itself have been identified as potential contributors to boys' and young men's academic performance. These include curriculum, pedagogy, learning environments, and literacy and numeracy.

#### **Curriculum, Pedagogy, and Learning Environments**

In the conclusion of his report, Jacob (2002) muses: “what if certain types of

curriculum, pedagogy, or learning environments are more effective for one gender than the other?” (p. 596):

Given the influence of noncognitive ability on educational attainment, it would be interesting to know whether certain school characteristics foster the development of such skills. This would not only deepen our understanding of the [decline in university] enrolment, but also may provide ways in which schooling could be restructured to foster greater success for boys (Jacob, 2002, pp. 596-597).

Boys are falling behind in terms of educational success. Boys do worse on tests, receive fewer academic honors in high school, and are more likely to be identified as having a learning-related disability (Holmes, 2011, p. 1). Schooling is increasingly feminized, where “curricula are being changed to reflect qualities more likely found in girls than boys” (p. 1). Reading is dominated by an ideology that sees opportunity as more important than direct, phonetic instruction.

The formal teaching of skills and concepts has declined or disappeared: instruction in high schools has become more inductive and less deductive, but boys do better in logical steps than in intuitive exploration...Current educational fashions appeal most to compliant middle or upper class girls who enjoy the learning processes...and least to those boys who are primarily task-oriented, unwilling to go beyond the expected minimum, and resistant to supervision” (p. 2).

**Numeracy and discovery learning.** As will be shown in a later chapter, one of the most important findings of this study was the young men's dislike of, and more

importantly, difficulty with, mathematics. Given that mathematics skills are essential to the study of the natural sciences, engineering, and business, a deficit in those skills rules out young men's opportunities in those fields. A description of the current state of mathematics education follows.

Since the late 1990s, the Ontario mathematics and science curricula have been driven by research into discovery learning (Alphonso, 2013). Discovery learning is a form of inductive learning “in which students build an understanding of a subject based on their experiences with the material” (Santrock, Woloshyn, Gallagher, Di Petta, & Marini, 2007, p. 335). Proponents of discovery learning believe it has a number of advantages over more traditional approaches: it is more meaningful and results in better retention because understanding comes from the student's own work; it enhances motivation, interest, and satisfaction; it enhances the development of intellectual capacities and problem-solving skills, it encourages learning how to discover and how to learn; and it promotes the transfer of skills to solve problems in new contexts (MacInerney & MacInerney, 2002).

Discovery learning is grounded in the work of Jerome Bruner who stated that an emphasis on discovery learning has the effect of leading the learner to be a constructionist, organizing their encounters with the subject matter to discover relatedness and regularity (as cited in Santrock et al., 2007, p. 335). The involvement of the teacher in discovery learning can vary across the spectrum from unguided to varying degrees of partial guidance. The partially guided form is the one found most often in North American schools (Santrock et al., 2007).

Discovery learning—discussed here only in the context of mathematics education—persists because some educators believe it is based on sound cognitive science.

However,

[m]any educators confuse “constructivism,” which is a theory of how one learns and sees the world, with a prescription for how to teach. Those same educators have latched on to the notion of students having to “construct” their own knowledge, and have assumed that the best way to promote such construction is to have students try to discover new knowledge or solve new problems without explicit guidance from the teacher....[But] cognitive activity can happen with or without behavioral activity, and behavioral activity does not in any way guarantee cognitive activity. (Clark et al., 2012, p. 8)

Learning requires the construction of knowledge, but withholding information from students does not facilitate the construction of knowledge (Clark et al., 2012). This is akin to asking someone to build a house without providing the fundamentals of how a house is actually built. Without teaching carpentry, the construction of a house would be unachievable. “If the learner has no relevant concepts or procedures in long-term memory, the only thing to do is blindly search for possible solution steps that bridge the gap between the problem and its solution” (p. 10).

In terms of the cognition process previously presented, this form of learning places a great burden on working-memory capacity because the problem solver has to continually hold and process the current problem state in working memory (Clark et al., 2012, p. 10). This constant search for solutions overburdens the memory system, both

preventing the committal of knowledge to long-term storage and the prevention of acquisition of new sensory stimuli. Consequently, “novices can engage in problem-solving activities for extended periods and learn almost nothing” (p. 10).

Dr. Marian Small, former dean of education at the University of New Brunswick, supports discovery learning because it promotes “alternative strategies to find the method that makes the most sense” to students (Anderssen, 2014). The ministries of education of Ontario and Alberta have recently announced plans to retain (Morrow, 2014) or implement (Staples, 2014) discovery learning. There have been grassroots efforts from parents, teachers, the public press, and some academics to have these policies reexamined to consider a return to a greater focus on expository instruction of basic mathematics principles (Alphonso & Maki, 2014; Macdonald, 2014; Morrow, 2014; Morrow & Alphonso, 2014). Such binary approaches discount the effective aspects of teaching basics and discovery learning. “The foundations and basic skills in math need to be integrated into problem based learning situations that help kids understand the meaning of numbers. We do not want our kids to only think that there is only one answer – one solution to anything” (Roberts, 2014).

MacInerney & MacInerney (2002) present a number of caveats regarding discovery learning for those looking at implementing it or reviewing its effectiveness. Such problems include: lack of skills by teachers; lack of appropriate resources; time pressures to complete required curricula; difficulties encountered by students, especially learners with exceptionalities; and, failure of teachers to recognize the needs of individual learners.

**Literacy.** Boys are unlikely to have both the will and ability to please the teacher and take the opportunity to master reading, thus contributing to reduced literacy skills (Holmes, 2011; Klinger et al., 2009). In their review of the Ontario education system for the Education Quality Assessment Office (EQAO), Klinger, et al. provide further insight into the depth of the literacy problem for boys: “there are no reported studies in which boys performed better than girls in reading and writing....Girls’ superior performance in reading has been a widely observed, relatively static pattern for at least the last forty years” (p. 2).

Few, if any, studies on the continuing need to teach the canonical works of English literature have been conducted. However, Michaels (2001) did exactly that for the Australian school system, which, upon examination of the Ontario 2007 published curriculum for grades 9-12, has many similarities with the Ontario system. In her study over the period 1965-1999, Michaels (2001) raised the curriculum as prescribed by the national government as a possible contributor to sustained lower literacy rates of boys. She focused on the stratification of students into various streams. The Top Level English Course defined the study of English as the study of English literature which places a high value on canonical and imaginative works in the three written genres of poetry, novel, and drama. Syllabus documents identify the calibre of suitable authors as Chaucer and Shakespeare. “[T]he syllabus makes clear its valuing of English canonical literature and literary language over the communication of ideas and information in forms other than the literary” (p. 26). In the bottom stream, “the conception of literature is 'ready appeal' for students. Australian works are particularly mentioned as appropriate for study. The

kind of reading stipulated for the top level is not required in the lowest level” (p. 27). These students are further represented in the syllabus as “lacking the capacity to read 'good' literature 'attentively' since their 'natural interests' are focused on contemporary non-literary contexts” (p. 28). Michaels insinuates such perceptions are “akin to biological determinism” (p. 28).

An examination of the Ontario curriculum for grades 9 and 10 (Ministry of Education, 2007a) and grades 11 and 12 (Ministry of Education, 2007b) show a strong alignment with those in the Australian system studied by Michaels (2001). The streams are divided into Academic, which is for students intending to pursue postsecondary education, and Applied, for students looking to end their academic studies at the end of high school, followed by direct entry into a trade or trade school. Unlike the Australian system, the Ontario Academic stream does include science. Given the transition of the modern economy to being increasingly knowledge- and technology-driven, it may become necessary to examine whether all students in the Academic stream need an equal exposure to the canonical English language works (Millar, 2013).

**Supplementary education.** The literature is rife with examples of boys outnumbering girls in remedial instruction (Carr-Chellman, 2010; Evers et al., 2006; Intini, 2006; Jacob, 2002; Sommers, 2000; Sommers, 2001). Alison Carr-Chellman (2010) provides a quantitative view of this phenomenon from the U.S.-based 100 Girls Project (Mortenson, 2006): boys outnumber girls 215:100 in special education; 276:100 have learning disabilities. She further reports that boys are four times more likely to be diagnosed with ADHD.



**Alternative education for boys.** Alternatives to the typical co-ed public secondary school have also drawn the attention of educators. Of particular note are the single-purpose schools (i.e., all-boys, Africentric, arts, sports, etc.) espoused by the Toronto District School Board (Toronto District School Board, 2011). These schools may offer boys and young men a more “boy-friendly” environment than that which is currently available (Wingrove & Reinhart, 2009).

### **Inside the Minds of Boys**

The results of this study point to the adolescent males' difficulties with particular subjects, especially mathematics. Some of those difficulties may be due in part to the adoption of discovery learning in the math curriculum, a process which may interfere with cognition and how children ideally learned in formalized instructional settings. Distinct characteristics of male brains may also be a contributor. This section introduces topics surrounding brain development and function and how they may relate to learning.

### **Cognition**

According to the cognitive information processing (CIP) view, the learner is conceived to be a processor of information similar to a computer (Driscoll, 2005). Information from the external environment is acquired in some form, processed, stored in memory, and eventually output as some form of learned capability. Adherents of the CIP model assume there is “an intervening variable between [the] environment and behavior. That variable is the information processing system of the learner” (p. 74). Components of that system include three forms of memory. *Sensory memory* is the first stage of information processing which is associated with the senses and functions to hold

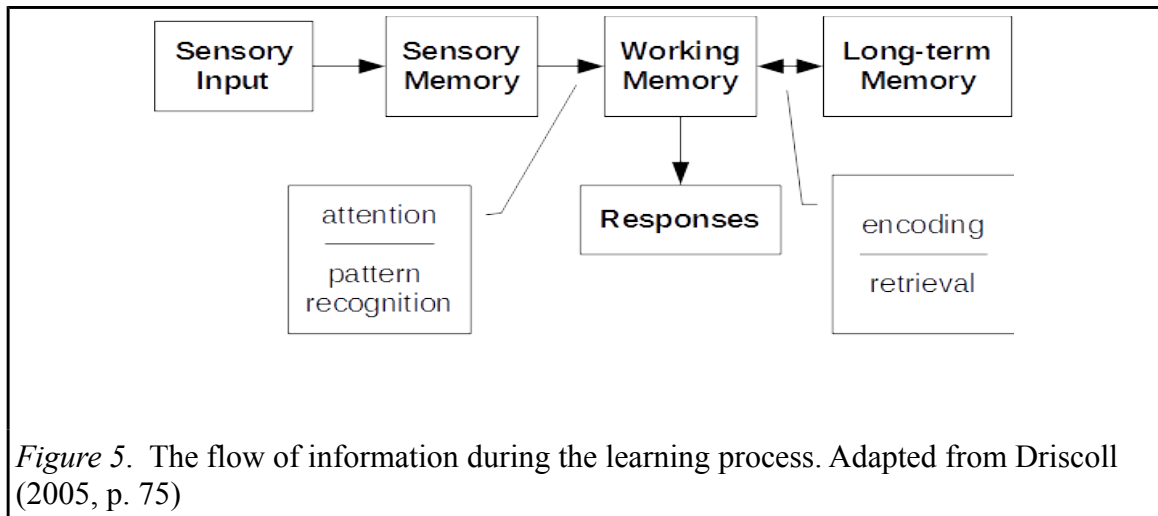
information in memory just long enough to be processed further (p. 74). *Working/short-term memory* is the stage at which further processing is carried out to prepare information for either long-term storage or a response. Working memory only holds information for a short time and the amount of information it can hold is limited. *Long-term memory* is the permanent mental warehouse of the things we know (Driscoll, 2005; Clark, Kirschner, & Sweller, 2012). A sensory input stimulus is briefly stored in the sensory memory.

1. Familiar shapes, letters, words, sounds, etc. are then detected during pattern recognition. Unfamiliar patterns may cause processing to slow because added attention is required to deconstruct the input to known patterns.
2. Upon entering working memory, the information is coded conceptually, giving it meaning.
3. In order for the information to be permanently stored in long-term memory, the meaning must be encoded: representations are constructed that are meaningful, forming connections related to knowledge already in long-term memory.

The information flow sequence is shown in Figure 5.

### **Systemizers and Empathizers**

In the opening pages of *The Essential Difference*, University of Cambridge psychologist Simon Baron-Cohen (2004) states that discussing sex differences drops one into the heart of a politically charged debate and for that reason he could not have published the book in the 1990s because the topic was just too politically sensitive. He identifies three types of thinking: empathizing, systemizing, and balanced. Empathizing "involves two components: the ability to attribute mental states to oneself and others and



the drive to respond with an appropriate emotion to that mental state" (Grove, Baillie, Allison, Baron-Cohen, & Hoekstra, 2013, p. 601). Systemizing allows an individual to predict the behavior of a system and therefore to control it. Balance thinkers incorporate aspects of both empathizers and systemizers in equal measure.

A system is defined as anything that takes inputs and delivers outputs, and includes everything from technical systems (e.g., a machine) through to natural (e.g., the weather), abstract (e.g., mathematics), social (e.g., a company), collectible (e.g., a library), and motoric (e.g., a tennis top-spin) systems that the brain can analyze or construct (Grove, et al., 2013, p. 601).

Baron-Cohen argues describes extensive research indicating that 60% of males exhibit primarily systemizing behaviours. Additionally, 20% of males exhibit a predilection for empathizing and 20% demonstrate balanced systemizing-empathizing behaviours. The proportions for females are strikingly different: 40% empathizers, 20% systemizers, and 40 % balanced.

Two recognized forms of thinking and reasoning are deductive and inductive. *Deductive reasoning* is reasoning from the general to the specific, working with general statements and deriving a specific conclusion. Deductive reasoning can be thought of as systemizing, observing behaviours of systems to deduce the contributions of individual components. Gurian and Stevens (2011) ascribe a predilection to deductive thinking in males. *Inductive reasoning* involves reasoning from the specific to the general, drawing conclusions about all members of a category based the observation of only some of its members (Santrock et al., 2007). Inductive reasoning parallels with empathizing, where

an intimate understanding of individual system components is developed.

### **Physical Activity and Intense Cognitive Work**

The importance of young men's physical activity to this study only developed during the data collection process. Sommers (2001, 2014) writes at length about boys' and young men's need for physical exercise—or rough and tumble play (R&T)—during the school day. However, increasing numbers of schools are banning R&T at recess with visible consequences to boys' and young men's cognitive abilities when such activity is no longer available. Two significant articles in this area of study were published in the same issue of the journal *Child Development*.

Pellegrini and Smith (1998) report on a study that found the academic performance of children who received five hours of physical education per week was superior to those who received none. Further, Pellegrini and Smith offer an adaptation of the cognitive immaturity hypothesis wherein not only are distributed breaks from intense cognitive work important for attention and cognitive performance, but that “the nature of the intervening break period is crucial. Specifically, activity of a playful nature might be important” (p. 585). Bjorkland and Brown (1998) have seen such breaks benefit males more than females.

An interesting finding of this study was that all of the adolescent male participants were involved in highly competitive sports, either at school and/or in their communities. Additional references to the literature with respect to adolescents' participation in formal sports are presented in Chapter 5.

## **Psychological Constructs**

The framework for teaching noncognitive skills, character, and executive function proposed later in Chapter 5 relies, in part, on the constructs of social cognitive theory (i.e. self-efficacy, locus of control, resilience, and self-regulation). The composition and construction of self is examined through these constructs. These constructs are inward looking and reflect an individual's perceptions about their own capabilities; how one is perceived by others; and the degree of control one has over one's life.

Developed by Julian Rotter (1954) and later expanded upon by Bandura (1977a), social learning theory is based on the idea that personality represents an interaction between individuals with their environment. Personality is neither independent of the environment, nor an automatic response to an objective set of environmental stimuli. A discussion of the breadth of social cognitive theory is beyond the scope of this thesis. Instead, a subset of psychological constructs within social learning theory are presented: self-concept/self-evaluation, self-efficacy, locus of control, self-regulation, and resilience.

**Self-concept/self-evaluation.** Social learning theory defines two forms of self-concepts: negative self-concepts are the proneness to devalue oneself; positive self-concepts are a tendency to judge oneself favourably (Bandura, 1977a, p. 139). In these terms, an individual's range of self-evaluation is not consistent across dissimilar areas: someone might be quite intelligent or gregarious, but may be athletic. For this reason, Bandura suggests that “measures of self-evaluation in a particular area of functioning are more meaningful than is a conglomerate index” (p. 139).

**Self-efficacy.** Self-efficacy is a strong source of motivation for individuals

involving their beliefs about themselves in relation to task difficulty and their ability to achieve a desired outcome (Driscoll, 2005, p.316). According to Bandura, “perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments” (as cited in Bandura, 1998, p. 3). People make judgements about their ability to perform certain actions required to achieve a desirable outcome. Based on those judgements, they choose whether or not to engage in those actions.

Self-efficacy is considered a generative capability, not a fixed trait (Bandura, 1998). Driscoll (2005) notes that people can develop self-efficacy beliefs in different areas and to different degrees; she further notes that optimistic self-efficacy appraisals benefit the individual, whereas realistic appraisals can be self-limiting (p. 318), implying that self-efficacy beliefs can be learned.

Bandura (1977b) proposed a framework whereby certain efficacy expectations can be induced or taught. The framework is comprised of categories of major sources of information. *Performance accomplishments* are a learner's own previous experience at a task. These experiences are especially influential because they are self-evident proof that the learner can perform the chosen task and achieve desired outcomes (p.195). *Vicarious experiences* are the learner's observation of a trusted role model attaining success at a task. Because these experiences rely on inferences from social comparison, they are less dependable than personal experience to induce desired outcomes (p.197). *Verbal persuasion* is the process of others persuading the learner that he or she is capable of succeeding. This technique is widely used because of its ease and ready availability.

However, efficacy expectations induced in this way are likely to be weaker than personal accomplishments, again because they do not provide an authentic experiential base for them (p.198). *Emotional arousal* is how learners' physiological state convinces them of probable success or failure. Individuals are more likely to expect success when they are not overcome by aversive feelings compared to being tense or agitated (p.198).

Prochaska (2004) discusses social cognitive theory as a philosophical view by noting it

specifies factors governing the acquisition of competencies that can profoundly affect physical and emotional well-being as well as the self-regulation of health habits. Knowledge creates the precondition for change, but additional self influences are needed to overcome the impediments to adopting new lifestyle habits. Efficacy belief is a major basis of action. Unless people believe they can produce desired effects by their actions, they have little incentive to act. (p. 243)

**Locus of control.** Developed by Julian Rotter (1966), locus of control is seen as the

perceived source of control over one's behavior. People with an internal locus of control believe they control their own destiny. They tend to be convinced that their own skill, ability, and efforts determine the bulk of their life experiences. In contrast, people with an external locus of control believe that their lives are determined mainly by sources outside themselves: fate, chance, luck, or powerful others. (Bradshaw et al., 2007, p. 651)

An individual's locus of control can be classified along a continuum from very internal to



very external.

**Self-regulation.** Driscoll (2005) describes a learner who self regulates as “setting goals for their learning and then attempts to monitor, regulate and control their cognition, motivation, and behavior, guided and constrained by their goals” (p. 328). A three-phase cycle which describes the processes of self-regulation was developed by Zimmerman (as cited in Driscoll, 2005, pp. 328-330). *Forethought* is having the declarative, procedural, and conditional / metacognitive knowledge “to know the conditions and contexts when these strategies should be used” (p. 328) *Performance* involves volitional control over performance where “individuals employ a variety of strategies to monitor their progress towards goal attainment, making evaluative judgements about their performance, about their self-efficacy for reaching goal[s], and about their personal goals in light of their achievement efforts” (p. 328). *Self-reflection* has individuals evaluating “their performance with an eye towards making improvements for the future” (p. 330). Figure 6 illustrates this cycle and lists some of the processes involved in each of the phases.

**Resilience.** Resilience is the ability to absorb high levels of disruptive change while displaying minimal dysfunctional behavior (Kemp, 2001; Werner, 1995). Bradshaw et al. (2007) provide additional definitions from the literature: ability to bounce back, rebound, or recover; the ability to successfully adapt following exposure to stressful life events; and being flexible and able to self-adjust, bounce back, cope with, or otherwise respond to challenges, adversities, change, or stress. They further state there are several qualities that make up resilience, including self-efficacy, locus of control, social support, interpersonal relationships, purpose in life, and having goals, direction, and hope for the

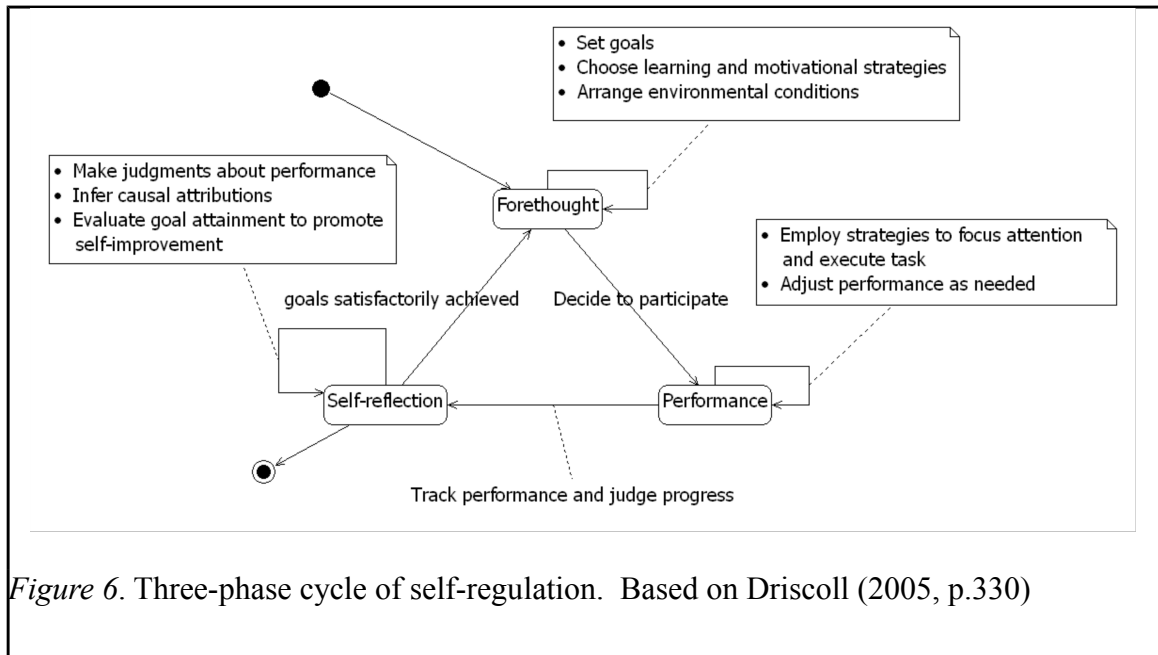


Figure 6. Three-phase cycle of self-regulation. Based on Driscoll (2005, p.330)

future.

## **Perception**

This study depended heavily on the perceptions of young men and their parents to ascertain the factors that may be affecting their academic performance. Perception is a very broad topic in philosophy, psychology, and many other disciplines dealing with the mind and how it relates to the environment. The treatment here is a very narrow one, dealing with how the perceptions of the participants might influence the validity and reliability of the collected data. A definition of perception is presented, which is followed by a brief discussion of perception in terms of social constructionism, the social construction of reality, and, some examples of studies that drew upon the perceptions of parent-child dyads.

Several recent studies have examined the perceptions of parent-child dyads (De Los Reyes, Lerner, Thomas, Daruwala, & Goepel, 2013; McKinney, Donnelly, & Renk, 2008; Xiao, Li, & Stanton, 2011). Interestingly, none gave a definition of perception nor were any philosophical underpinnings offered. The *Oxford English Dictionary* presents one definition of perception as “the action of the mind by which it refers sensations to external objects, phenomena, etc., as their cause; the mental product or result of perceiving something” (perception, 2014). Note there is no inference or implication as to the veracity of the perception. Nonetheless, there was no reason to believe that the participants' perceptions were a misrepresentation of the people and phenomena around them.

**Social constructionism.** Constructionism argues that knowledge—of one another

or the world around us—arises from social processes and interaction. In principle, social scientific knowledge is no different from everyday knowledge. Constructionists believe that people make their own reality and that there are no universal laws external to human interaction waiting to be discovered (O'Dowd, 2003). The core idea of social constructionism is that some object or objects are caused or controlled by social factors such as the interactions of humans, rather than natural factors (Mallon, 2008).

**Social construction of reality.** Berger and Luckmann (1966) state “reality is socially constructed and the sociology of knowledge must analyze the process in which this occurs” (p. 1). Reality is a quality pertaining to phenomena that are recognized as having a state of being independent of one's own willingness to accept such existence. Knowledge is the certainty that the phenomena are real and that they possess specific characteristics (p. 1). “Sociology of knowledge is concerned with the relationship between human thought and the social context within which it exists” (p. 4). The social construction of social reality emphasizes the fluid identities of self and the partiality of all truths (Lincoln, Lynham, & Guba, 2011, p. 120).

**Perceptions of parents and their children.** The results of three studies are presented here which were seen to inform an understanding of the validity of this study's data. De Los Reyes et al., (2013) examined parents' and adolescents' emotion recognition abilities in relation to discrepancies between parent and adolescent perceptions of daily life topics. In a sample of 50 parents and adolescents ages 14-to-17 years ( $M=15.4$  years, 20 males, 54 % African-American), parents and adolescents were each administered a performance-based measure of emotion recognition. Structured interviews were also

administered to participants to directly assess each of their perceptions of the extent to which discrepancies existed in their beliefs. A major finding of their study was that the more parents and their children disagreed on the fundamentals of a daily life topic, the wider the discrepancy of the perceptions of the other.

Xiao, Li, and Stanton (2011) studied the perceptions of parent–adolescent communication within families and the concordance between parent and youth perceptions regarding open communication in their families. Parental and youths’ perceptions of open communication in the family were categorized into “high” and “low” groups using a median split in scores. Four parent–youth concordance groups (i.e. high–high, high–low, low–high and low–low) were derived based on the combination of the levels of parental and youths’ perceptions. Parental and youths’ perceptions about open communication were modestly correlated ( $r = 0.129$ ,  $p < 0.05$ ). The level of concordance differed by youth gender with male adolescents and their parents being more likely to perceive lower levels of open communication (i.e. “low–low”) than females and their parents (32% versus 19%,  $p < 0.05$ ). Xiao, et al. found there was concordance (i.e., agreement) in 54% of the perceptions of the parent-child dyads.

McKinney et al. (2008) studied the effects of late adolescents’ positive and negative perceptions of their parents in the association between perceived parenting and late adolescent emotional adjustment. Their sample consisted of 151 males and 324 females ranging in age from 18 to 22-years. Results of the study suggested that perceived parenting, positive and negative perceptions of parents, and emotional adjustment as reported by late adolescents are all correlated significantly. Furthermore, the relationship

between late adolescents' positive and negative perceptions of parents and late adolescent emotional adjustment became non-significant when examining father relationships.

### **Project Management**

The relationship between this study's results—specifically the identification of the noncognitive skill time management as being deficient in most of the young male participants—and project management arose while preparing Chapter 5. That chapter includes a discussion on integrating project management theory and practice to create a framework for teaching executive function and noncognitive skills. The remainder of this section presents the fundamentals of project management to inform the reader for the ensuing discussion.

Howell, Sulak, Bagby, Diaz, and Thompson (2013) identify three executive function skills that operate to maximize student success: *planning*—"a student's ability to map out the necessary steps needed to reach a desired goal or complete a task, and to determine priorities in completing those steps" (p. 15); *organization*—a student's ability to "develop and maintain his or her own systems for organizing his or her learning environment and/or materials" (p. 16); and, *time management*—a student's ability to determine the time needed to complete a task, [while] judging how much time to allot to specific tasks based on the total amount of time available" (p. 16).

Drawing from the present author's knowledge of project management theory and practice and many years of experience managing projects, it can be stated that these skills—planning, organization, and time management—lie at the heart of managing projects successfully. The practice of project management (PM) was first codified in the Project

Management Body of Knowledge (PMBOK®; pronounced *pim-bok*) in a 1983 white paper. It also is the American National Standards Institute's standard for project management (the 2008 version, used for this study, is standard no. 99-001-2008). Byrne (2010) has drawn parallels between PM and 21<sup>st</sup> century life skills (i.e., “communications skills; negotiating, influencing, and persuasion skills; empathy; cooperation, teamwork, and collaboration; critical thinking and problem solving; ethics, self-assessment and self-management; time management and positive thinking”) (p. 4). A rudimentary commonality analysis highlights overlaps between these sets of skills.

### **Projects, Programs, and Portfolios**

The terms project, program, and portfolio have precise meaning in the PMBOK and understanding these meanings is essential to setting “project” work apart from other more traditional forms of effort such as operations or service management. The researcher's suggestions on how each unit of organization can be seen in an educational perspective are interwoven within the following discussion.

**Project.** A “temporary endeavour undertaken to create a unique product, service, or result (Project Management Institute, 2008, p. 434; cited hereafter as PMBOK4). This is an expansive definition allowing the inclusion of far more than things built and products designed. In the education case, a student's homework project or a class endeavour could all fall under the rubric of a project.

**Program.** A “group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements of related work outside of the scope of the discrete projects in a

program” (PMBOK4, 2008, p. 434). An example in education could be several groups of students each working on a component of larger class project. The benefit of such an organization would be the ability to work on multiple components simultaneously, thus hopefully [sic] shortening the elapsed time required when compared to sequential/serial execution. “Outside” work would include the efforts to coordinate the activities of the separate groups or “projects”.

**Portfolio.** Collections of “projects, programs, subportfolios, and operations managed as a group to achieve strategic objectives” (Project Management Institute, 2013, p. 577; cited hereafter as PMBOK5). The educational context may be more difficult to comprehend than projects or programs. One example might be how a student manages a series of different projects for different classes in a given school year. They are essentially building up a portfolio of their learning.

### **The Triple and Quadruple Constraints**

The basic project components of the *triple constraint* are: *scope*—the work that is to be done, no more, no less; *time*—the minimum elapsed time required to complete the entirety of the work included in the scope; *cost*—the resources required to complete all work set forth in the scope of work within the prescribed time. To understand the dependent interrelationships between these components, the project manager's triangle, as shown in Figure 7, is used. If there is any change to one side of the triangle, the other two sides necessarily change, with a directly proportional relationship: if one side increases in length, the other sides *may* also increase in length, or magnitude, to compensate. The tentativeness of the previous statement results from the components not necessarily



having equal capabilities to influence the others. A change in scope *will* affect time and *will* affect cost. A change in the elapsed time to *may* affect the scope, but *will* affect the cost. A change in the cost *may* affect scope and *may* affect time. Figure 8 illustrates the relationships in the triple constraint.

The quadruple constraint adds *quality* to the relationship(s) between scope, time, and cost. Quality is the degree to which the inherent characteristics of a deliverable fulfills requirements (PMBOK4, 2008, p. 436). Figure 8 shows the project manager's triangle modified to include quality. Causality between changes in quality and the other components is not necessarily bidirectional, or even proportional. Increased quality almost always predicates increased scope, time, and cost. However, increases in scope, time and/or cost do not necessarily produce increased quality. In some instances the relationship is inversely proportional: unplanned increases in scope, time, and/or cost cause a decrease in quality.

### **The Project Management Body of Knowledge**

The Project Management Body of Knowledge (PMBOK) is a framework that describes the constituent components of the project management process and the

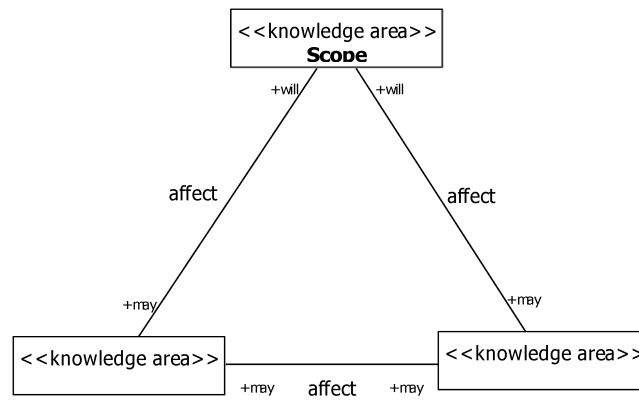


Figure 7. The triple constraint of project management

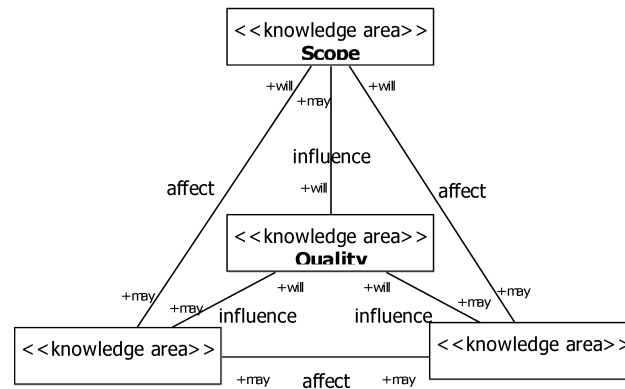


Figure 8. The project management quadruple constraint.

relationships and process groups and knowledge areas—the key competencies required to successfully manage a project (Schwalbe, 2007, p. 12). Knowledge areas are composed of processes—series of actions directed toward a particular result (Schwalbe, 2007, p. 80). Processes have inputs, tools and techniques used to manipulate or transform those inputs in outputs. Figure 9 shows the general organization of the PMBOK. There are nine knowledge areas in the PMBOK, each associated with specialized competencies for different aspects of a project. Table 2 lists those knowledge areas and provides a brief description of each. Refer to Appendix D for details of the knowledge areas, their processes, and the inputs, outputs, and tools and techniques associated with each knowledge area.

There are five process groups. *Initiating* processes include defining and authorizing a project, or subprojects of a larger project (Schwalbe, 2007, p.80). *Planning* processes assist in “devising and maintaining a workable scheme to ensure that the project addresses an organization's needs” (p. 80). *Executing* processes involve “coordination people and resources to carry out the various plans [to] produce the products, services, or results of [a] project” (p. 80). *Monitoring and controlling* processes assist with “regularly measuring and monitoring progress to ensure that [a] project meets its intended objectives” (pp. 80-81). *Closing* processes “formalize acceptance of the project and end it efficiently” (p. 81).

There are several characteristics of process groups to keep in mind. First, they are not a metaphor for the different phases in the project life-cycle. Instead, they describe a generalized purpose of the processes within them. Second, only the planning group has

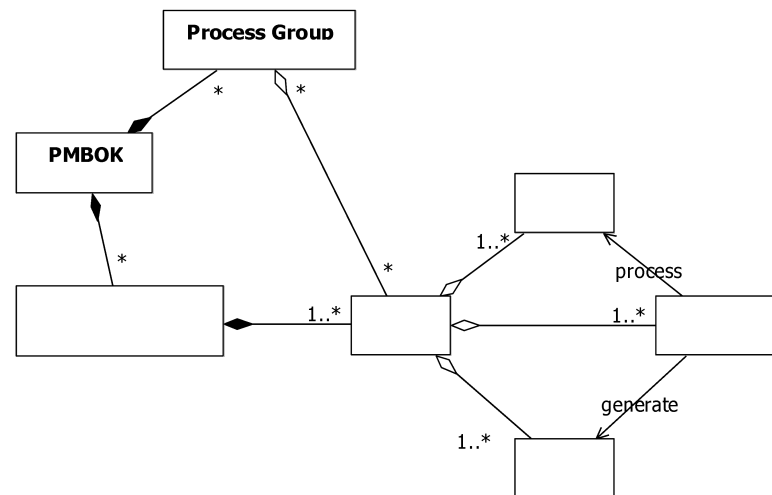


Figure 9. Organization of the project management body of knowledge.

Table 2

*Knowledge Areas of the Project Management Body of Knowledge*

Knowledge Area	Description*
Integration Management	Coordination of all other knowledge areas throughout the life of the project (Schwalbe, 2007, p. 127)
Scope Management	Definition and control of the work that is, and is not, part of the project (p. 181)
Time Management	Ensuring the timely completion of a project (p. 218)
Cost Management	Ensuring that a project completes within an approved budget (p. 266)
Quality Management	Ensuring the project meets the needs for which it was undertaken (p. 307)
Human Resources Management	Making effective use of all stakeholders involved with the project (p. 361)
Communications Management	Timely and appropriate creation, collection, dissemination, and disposition of project information (p. 407)
Risk Management	Identification, analysis, response to risk throughout the life of a project (p. 447)
Procurement Management	Acquisition of goods and services from outside the performing organization.

\* Adapted from Schwalbe (2007)

processes from all of the knowledge areas. This heavy reliance on planning makes the project management approach described in the PMBOK so effective and useful. That is also part of the attraction of adapting its use as a pedagogical framework for the development of noncognitive skills, character, metacognition, resilience, self-management, and locus of control, to name but a few of its potential applications in addressing young men's academic performance.

### **CHAPTER THREE: METHODOLOGY**

This chapter presents the research design of the study, including support for: selecting an exploratory approach; the use of *verstehen* (see discussion of *verstehen* on page 52 of this document); the adoption of data collection through qualitative, semi-structured interviews; and, using narrative analysis to analyze the interview data. This is followed by a description of the study participants, the methods used to recruit them, and the ethical issues with regards to the participants and the study as a whole. Data collection instruments and procedures are then elaborated, followed by a detailed description of the data analysis process.

#### **Research Design**

Chapters 1 and 2 laid out a framework for investigating the behaviours of adolescent males and how such behaviours may influence their choosing to apply to or being accepted into universities. The review of the literature was found quiet on what boys have to say for themselves about the factors that positively and negatively influence their academic performance in secondary school and their chances of attending university.

#### **Research Objective**

The objective of a research study varies depending on what the researcher is trying to accomplish. Exploratory research has as its purpose “the examination of a little understood issue or phenomenon in order to develop preliminary ideas and move toward refined research questions” (Neuman, 2011, p. 39). Explanatory research has as its primary purpose the explanation of why events occur, and how to build, elaborate,



extend, or test theory (Neuman, 2011, p. 40). Descriptive research has as its primary purpose “to paint a picture using words or numbers and to present a profile, classification of types, or an outline of steps to answer questions such as who, when, where, and how” (Neuman, 201, p. 38).

This study was classified as exploratory because it addressed a dearth in the literature which speaks to the perceptions of parents and their adolescent sons as to the factors that influence the sons' academic performance and/or underperformance in schools. An exploratory process can be further described as

those engaged in exploratory research are concerned with the development of theory from data in a process of continuous discovery... [they] do not approach their project according to any set formula [but are] flexible and pragmatic [and] will engage in a broad and thorough form of research. Those engaged in exploratory research are concerned with the development of theory from data in a process of continuous discovery (Davies, 2006, p. 111).

An exploratory design can be likened to *verstehen* (M. Kompf, personal communication, 2 April 2012)—German for understanding—developed by Max Weber, which is rooted in an “empathetic understanding of the everyday lived experience of people in specific settings” (Neuman, 2011, p. 101). *verstehen* often refers to “understanding from inside, rather than through the study of external behavior, and it is often seen as the distinctive method of the human sciences” (Verstehen, n.d.). The *verstehen* process is similar to the practice of “management by walking around” (M. Kompf, personal communication, 2 April 2012). In a business context, management by

walking around (MBWA) is

[An] unstructured approach to hands-on, direct participation by the managers in the work-related affairs of their subordinates, in contrast to rigid and distant management. In MBWA practice, managers spend a significant amount of their time making informal visits to work area[s] and listening to the employees. The purpose of this exercise is to collect *qualitative information*, listen to suggestions and complaints, and keep a finger on the pulse of the organization. (management by walking around, n.d.)

The *verstehen* process can also be related to the metaphor of rolling a snowball—as when one builds a snowman with the snow clustering into a ball, individual aspects of seemingly disparate knowledge build a new entity. In such a perspective, the understanding is built from within. The *verstehen* process can also be represented by the spiral model developed by Barry Boehm (1986), which was originally conceived to represent the iterative-incremental software engineering process. In its essence, the spiral model allows for elements of the knowledge domain and problem area to be added as they become available or known. This ensures that there is no conflict with previous iterations of the research.

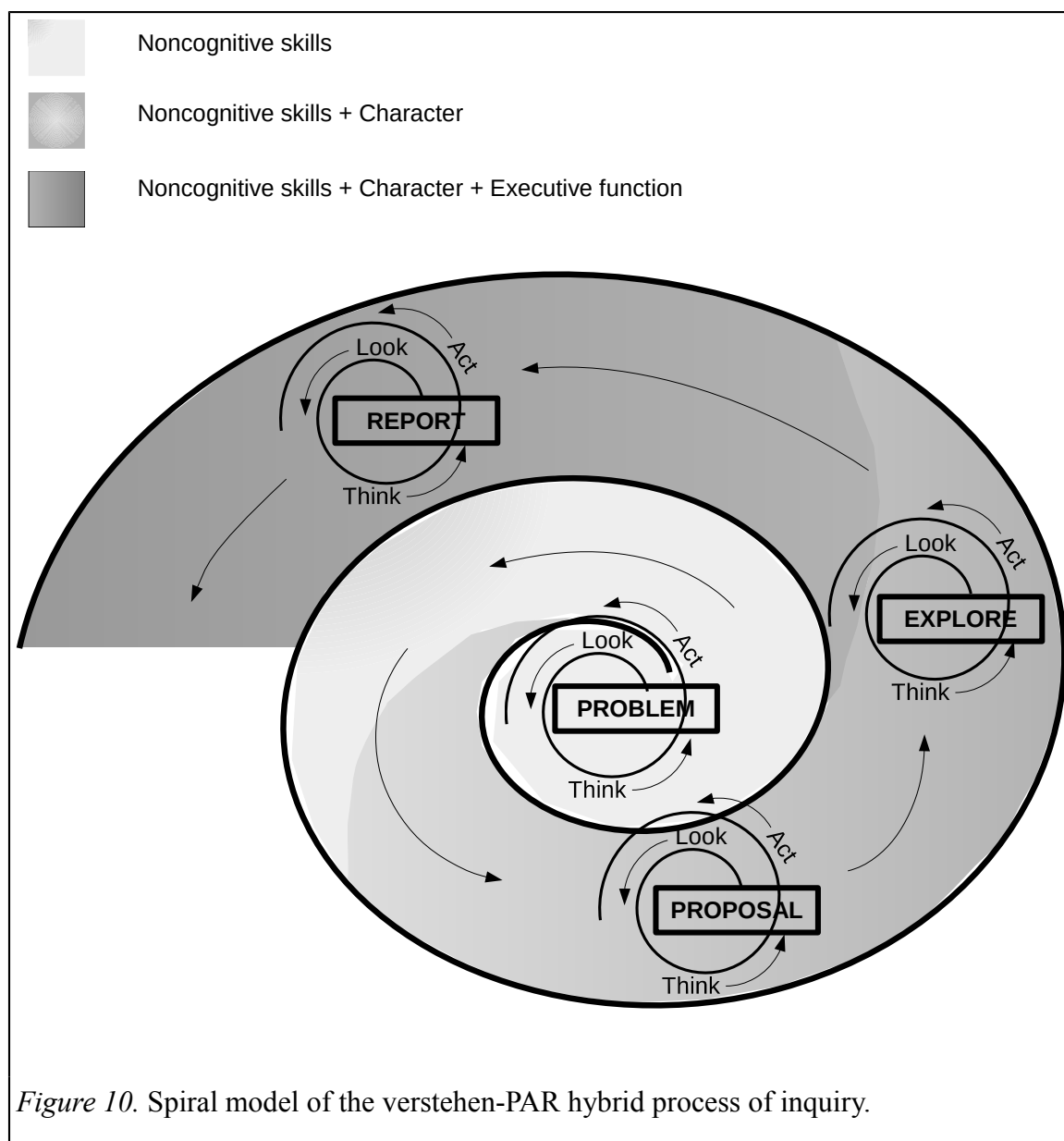
The model to represent the processes used for this study can best be described as a *verstehen*-participatory action research (PAR) hybrid. The goal of PAR is to improve the quality of people's organizations, communities, and family lives. Stringer (2007) suggested an interacting spiral model—spiral conveys that “research is not neat, orderly, and linear” (Creswell, 2012, p. 584)—for action research composed of multiple

successive stages, with each stage made up of three phases. The *look* process entails building a preliminary picture and gathering relevant information (p. 8) and may include activities such as observation, listening, and reading (Stringer, Christensen, & Baldwin, 2010). The *think* phase could include processes such as reflection, remembering, analysis, sorting, and selecting (p. 14). *Act* involves the actions emerging from *thinking* and may include planning, implementing, evaluating and reporting (Stringer, 2007).

For this study, there were four iterations. The first iteration developed the problem to be investigated. The problem originally examined performance in terms of noncognitive skills. The second iteration prepared the research proposal. By this time, character had been added to the behaviours of adolescent males to be studied. Iteration three was prosecution of the study itself including data collection. The final iteration was primarily data analysis and preparation of the research report (i.e., the dissertation). It was during data analysis that executive function appeared as a contributor to academic performance. Figure 10 shows the adapted spiral, with a look-think-act cycle for each iteration. Included in that diagram is the gradual addition of additional sets of behaviour that would assist in understanding young men' decreasing ability to enter postsecondary education.

### **Research Approach**

The approach used for this research can best be described as a “generic qualitative study” (J. Engemann, personal communication, 9 April 2014). It used semi-structured qualitative interviews to collect data. A thematic narrative analysis was employed where “emphasis is on the content of a text, 'what' is said more than 'how' it is said, the 'told'



rather than the 'telling'" (Riessman, 2004).

### **Research Strategy**

When the study was originally conceived, it was comprised of two distinct phases to be conducted consecutively, with the first phase informing the second. Phase 1 would ask parents to identify the behaviors, or lack thereof, of their adolescent sons that lead to their academic overperformance and/or underperformance. Phase 2 would ask the adolescent males to talk about the academic performance behaviours identified by their parents in Phase 1. The researcher's original doctoral supervisor, Dr. Michael Kompf, further suggested that a focus group for the parents would be the most efficient and dynamic source of qualitative data from the parents.

### **Changes to the Research Strategy**

Changes to the research design occurred as direct results of the difficulty recruiting participants. Consultations with the learning centre director revealed that parents at his centre were not willing to take part in a focus group. They were however willing to participating in individual interviews.

The delays encountered due to the initial lack of response at the learning centre forced a compression of the intended data collection period: the preference was to conduct as many interviews as possible before the end of the academic year. The final change made to the project plan was necessitated by the compressed six-week time-frame in which all interviews took place. The result was that parent and adolescent male interviews took place concurrently, rather than consecutively. The interviews were instead conducted by parent/child pairings. This provided a parent's insights on his or her

son prior to interviewing the adolescent male participant. Figure 11 shows the final sequence of activities for the study.

### **Study Participants**

This section describes the original intended participant characteristics, the recruiting process, and its effects on the study design. This is followed by descriptions, demographics, and other information of the study participants.

#### **Study participant selection criteria**

Before proceeding any further into the design of the study, it was necessary to determine the characteristics of potential participants. The researcher conducted a pilot study as part of a doctoral research course (Tierney, 2012; included herein as Appendix G). The literature review exposed the sparse direct engagement with parents and their sons in terms of existing research. Therefore, it was decided that it was appropriate to give voice to these groups. The pilot study showed that, as young males moved through adolescence, the frequency of unproductive, unhealthy behaviors increased for some of them. Hence, it was decided to focus on adolescent males 12 to 18 years of age. The study further showed that there was no association between the sex of the parent/guardian and the identification of productive/unproductive behaviors, thus no preference was established for the sex of the parent participants.

#### **Participant Recruiting**

Participant recruiting was the most frustrating aspect of the field work. This section describes those frustrations, but leaves all discussion of ethical considerations to a subsequent section. The original study design called for two sets of participants: one set

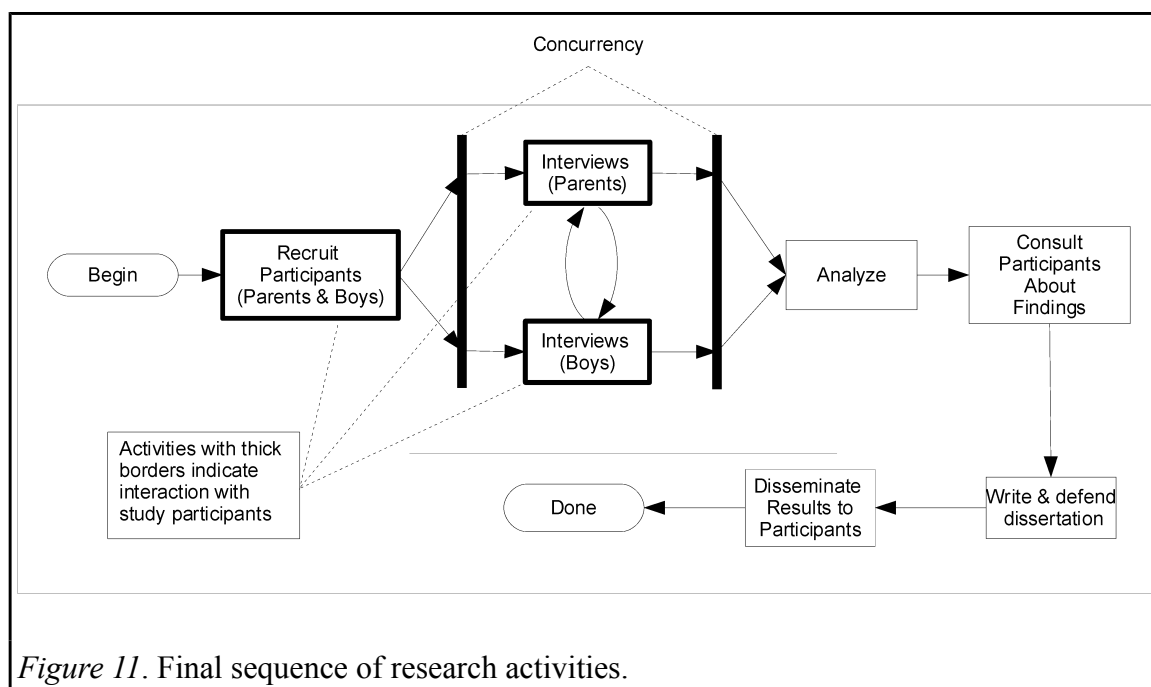


Figure 11. Final sequence of research activities.

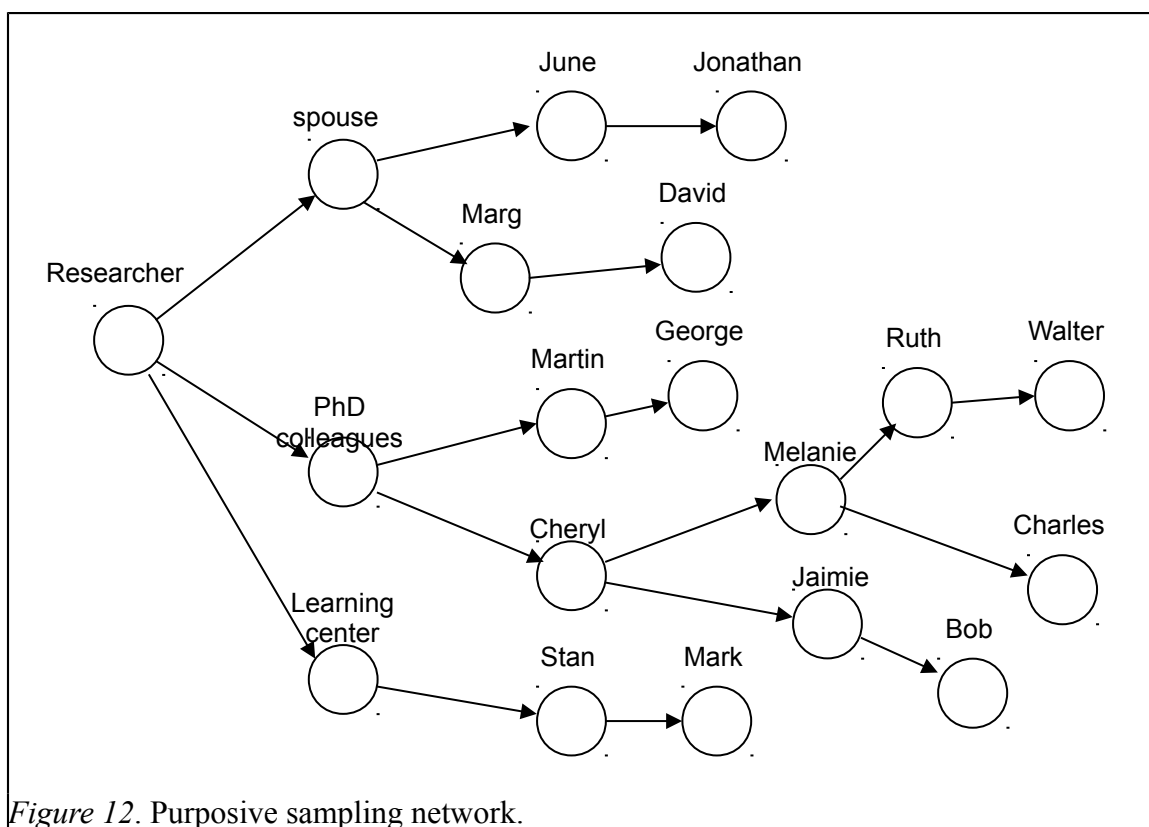
of parents for a focus group; and one set of adolescent males for interviews. The intent was to interview all parents first before interviewing their sons.

The original recruiting plan sought to find focus group/interview participants, both parents and adolescent males, through a local commercial supplemental education and tutoring centre. However, after several months, only one father-son pair identified through the learning centre volunteered to participate. This required that alternate forms of sampling be investigated. Network sampling—“a type of nonrandom sample in which the researcher begins with one [participant]...then identifies other [participants] and then repeats the process again and again” (Neuman & Robson, 2012, p. 133)—proved to be effective. One avenue for recruiting was to solicit assistance from fellow Ph.D. students with whom the researcher had studied and worked. Combining this strategy with the switch to an interview-only format turned out to be fruitful: nine of the fifteen study participants were either directly or indirectly, through subsequent referral, recruited. Working at arm's length, the researcher's spouse helped recruit four more participants. Figure 12 shows the sociogram of the recruiting network. In all, fifteen interview participants were recruited, distributed throughout Ontario including eastern Ontario, the Greater Toronto Area (GTA), northern Ontario, and the Niagara region. Details of the participants are included in Section 4. Homogeneity amongst the participants, particularly the young males, could not be implied apart from age and sex.

### **Description of Participants Selected for Study**

There were a total of 15 participants in the study: seven adolescent males and eight parents. One parent for each of the males participated. There was one participating





parent whose foster son, J. D. was not interviewed. A short description of each parent-son dyad is provided below.

**Cheryl and JD.** Cheryl is the 56 year old foster mother of JD. She is a senior administrator at an Ontario postsecondary institution. JD was 16 years old when he left Cheryl's care; he was not available for an interview in large part due to laws protecting foster children. Cheryl has cared for over 80 foster children.

**Jaimie and Bob.** Jaimie is the 40-year old mother of Bob. She works as a coordinator at an Ontario community college. Bob was 15 years old and was just finishing the ninth grade at the time of his interview. Bob has been diagnosed with attention deficit hyperactivity disorder (ADHD).

**Melanie and Charles.** Melanie is a 54 year old stay-at-home mother. Charles is 15 years old and had just finished the ninth grade. Melanie also cared for four foster children, all of whom are older than Charles. Charles' family has lived in their current community for approximately one year prior to the interviews with him and Melanie. Prior to that, they lived in a city where gang activity is rampant and street drugs easily obtained.

**Ruth and Walter.** Ruth is the 48 year old mother of Walter. Walter was 14 years of age at the time of his interview and has just completed the ninth grade. His birthday is in late December, making him one of the youngest students in his class(es). Walter's school is in a district that is well known for gang activity and the ready availability of street drugs.

**Marg and David.** Marg is 48 years old and works full-time as a senior manager

for a logistics and transportation company. David was 16 years old at the time of his interview and has just completed grade 11. Marg also has a 10 year old daughter. David is passionate about trying to one day gain entry as a player in Major League Baseball®, focusing most of his time outside of school on that pursuit.

**Martin and George.** Martin is a 47 year old healthcare consultant. George was 15 years old at the time of his interview and has just finished grade 9. Martin also has a 17-year old son.

**Stan and Mark.** Stan is a 52 year old entrepreneur. Mark was 14 years old at the time of his interview and has completed grade 8. Stan also has another son and a daughter, both of whom are older than Mark.

**June and Jonathan.** June is 56 years old and employed in the food service industry. Her son, Jonathan, was 15 years old at the time of his interview and has completed grade 9. Jonathan has a younger sister.

Table 3 summarizes demographic and other information known about each parent. Table 4 summarizes demographic and other information known about each of the adolescent males. All of the parents are married; the young men are attending school regularly (i.e., there did not appear to be a truancy issue); none of the adolescent males were working by necessity to help support their family; and, the families had sufficient financial resources to allow the young males to participate in organized sports in their community. All of the young men, except for J. D., were involved in organized sports year-round.

### **Methodological Delimitations of the Study**

Several methodological delimiting factors need to be explained here.

Delimitations are factors that may affect the study, but that are under the control of the researcher (Mauch & Park, 2003, p.114).

Intellectual character was examined by inquiring about the adolescent males' curiosity of the natural world. However, within the context of the study, the natural world was not limited to the plant and animal kingdom. It also included natural settings (e.g.,

Table 3

*Demographic and Other Information for Parent Participants*

Parent Participant	Sex	Age*	Marital Status	Occupation	Highest Education Attainment
Cheryl	Female	56	Married	Postsecondary institution senior administrator	Master's degree
Jaimie	Female	40	Married	Coordinator at a postsecondary institution	College diploma
Marg	Female	48	Married	Logistics senior manager	Bachelor's degree
Martin	Male	47	Married	Healthcare Consultant	Master's degree
Melanie	Female	54	Married	Full-time homemaker	High school diploma
Ruth	Female	48	Married	Mortgage Agent	High school diploma
Stan	Male	52	Married	Entrepreneur	High school diploma

\* At the time of the interview

Table 4

*Demographics and Other Information for Adolescent Male Participants*

Name	Age*	Last Completed Grade*	School Board
Bob	15	9	Roman Catholic
Charles	15	9	Roman Catholic
David	16	11	Roman Catholic
George	15	9	Public
Jonathan	15	9	Roman Catholic
Mark	14	8	Public
Walter	14	9	Roman Catholic

\* At the time of the interview

waterfalls, mountains, the beach) more generally, as well as outer space (e.g. astronomy, space travel). It was believed that a curiosity about the natural world might be an indicator of the young man's proclivities towards studies of the science, technology, engineering, and mathematics (STEM) disciplines.

Participants (parents and their sons) were queried about the young men's general performance in school, subjects that they did and did not find interesting, and subjects which they had difficulty understanding and mastering. However, no assessment of individual cognitive ability was performed at any time during the course of this study. Nor did the research have access to the young men's actual grades. This approach was taken for several reasons. It was believed such assessments would be an intrusion on the goodwill and privacy of the participants who chose to take part in the research. Further, the researcher did not have the professional certifications necessary to administer educational tests or evaluate or interpret the results.

The young men's use of social media (i.e., Facebook, Twitter, YouTube) and how it might influence their non-cognitive skills, especially the ability to work in groups, was not studied. It was believed that a basic understanding of non-cognitive skills was valuable on its own quite apart from the compounding effects of social media.

The area of thought under the rubric of “masculinities”—issues related to sexuality, social construction of gender, stereotypical behaviours, etc.—has intentionally not been considered. It was believed that the specific factors under study needed to be examined in isolation before accounting for added context.

### **Data Collection and Analysis**

What follows is a description of instrumentation, data collection procedures, reliability and validity and other features of the research design for this study. The development of the research instruments (i.e., scripts for qualitative semi-structured interviews), data collection procedures, and the data analysis process are presented.

#### **Instrumentation.**

Application of the verstehen process to the development of data collection instruments took the form of a discovery conversation with one of the participants—June, Jonathan's mother—which took place in March 2013. The results of that discussion pointed to several additional factors that could influence young men's academic performance which are not currently seen in the discourse on the SbEI: in the case of June's son, positive behaviours associated with intellectual, civic, and performance character were not strong in her view; the feminized curriculum contributed to a lack of interest in several subjects, particularly math and English; and, physical activity. Table 5 lists excerpts from that conversation and the topics that arose. These topics helped to further refined the framework around which the parent and adolescent male interviews were modeled. In some instances, intended topics were mentioned in the conversation with June. New topics arose as well while talking with June which were added to the interview scripts.

Tables 6 and 7 list the questions in the parent and student interviews scripts, respectively, and the information that was sought by each question. The interview scripts can be found in Appendix E – Parent Interview Scripts and Appendix F – Minor Child



Table 5

*Excerpts of Discovery Conversation with June.*

Excerpt	Investigative Topic
Yes, [the decline in enrolment of males in postsecondary education] does matter considering I have a son who does not like school. I do worry about him getting through.	Importance of the decline in enrolment of males in postsecondary education
Yes, [it important for Jonathan to attend post secondary education institution]. At this point [he] may not be [more than a construction labourer].	Importance of the decline in enrolment of males in postsecondary education, future career
I will say [Jonathan] hates [school]. This year he just [barely] passed.	Personal attitude towards school, performance in school.
[Jonathan] says "I cannot sit still".. so you know. He has trouble sit still in school and I know that teachers and they all like him talked to the teachers and they think that he is great kid, but he really has trouble concentrating.	Attentiveness in class
So and what is that when they get to high school they only have gym in one of the semesters.	Physical activity
I have to say he has always gotten [assignments] in on time. Often he waited till the last minute	Time management
"Never" in response to "does he ask for help?"	Willingness to ask for help with schoolwork
He does tell me that he had a female teacher that either favored the girls or who does not understand boys.	Perceptions of teachers
Math is up there that he really does not like it or does not find interesting.	Subjects least enjoyed.
He likes gym and he does like history.	Enjoyable subjects

Table 6

*Information Sought by Parent Interviews*

Question	Purpose
Are you aware that a gender imbalance in post-secondary education exists?	Gain an understanding of parents' awareness of the decline of male enrolment in higher education.
Ascertain the awareness parents may have of the sex-based enrolment imbalance. Determine parent's knowledge and understanding of gender imbalance Assuming that gender imbalance in post-secondary education exists, does it matter to you? Why?	Understand the importance of the decline of male enrolment in higher education to parent
Is it important for you that your son attend postsecondary education? Why?	Understand the importance of postsecondary education to parent
Has your son ever expressed his personal attitude toward school? If yes, what is it? If not, what do you think it is on the basis of his behavior(s)?	Determine parent's understanding of their son's attitude to school
How is your son performing at school?	Understand parent's awareness of son's performance in school
Non-cognitive skills: Describe your son's facility regarding attentiveness in class, time management / organizational skills, ability to work with others, willingness to ask for help with his work	Understand parent's awareness of son's demonstration of non-cognitive skills
What does your son think of his teacher(s)? On average, how many male teachers does your son have? Do you think this has any bearing on his attitude toward school?	Understand parent's awareness of son's perception of their teacher(s). Expose any issues regarding the sex of their son's teacher(s).
Which school subjects does your son enjoy or find interesting?	Identify subjects that trigger their son's curiosity and/or motivate their son to perform at a high level

Table 6 (cont'd)

*Information Sought by Parent Interviews*

Question	Purpose
Which school activities / subjects does your son least enjoy or find the least interesting?	Identify subjects that do not trigger their son's curiosity and/or demotivate their son
Does your son participate in: social events; community groups; or organized sports.	Understand parent's understanding of their son's behaviors in a social setting
How often does your son have regularly scheduled physical activity in school?	Understand the relationship between boys' activity level and performance/behavior in school
Is your son curious about the world around him: community / society? the natural world?	Understand parents' perception of the son's civic and intellectual character.
Are there any additional comments you would like to add regarding the various topics we have just discussed or anything regarding school or your life outside of school?	Allow parent to provide additional insights into the issue of the gender imbalance.

Table 7

*Information Sought by Adolescent Males' Interviews*

Question	Purpose
How are you doing in school?	Assess the interviewee's understanding of his performance in school
Which school subjects do you most enjoy or find most interesting?	Identify the subjects the boy enjoys
Which school subjects do you least enjoy or find the least interesting?	Identify the subjects the boy does not like
Do you like to read? If yes, what and why? If not, why?	Determine if the boy likes to read and the types of reading he enjoys
Describe the following about yourself Attentiveness in class Time management / Organizational skills Ability to work with others Do you ask for help with your schoolwork?	Determine the level of non-cognitive skills exhibited by the boy
What do you think of your teacher(s)?	Get the boy's general impression of his teachers
On average, how many male teachers do you have? Is it important for you to have male teachers?	Understand the importance of having male teachers
Would you like to attend college or university? Why?	Determine if the boy thinks he would like to attend postsecondary education and the reasons for it
Have you ever thought about what career or occupation you would like to have as an adult?	Has the interviewee thought about what he would like to do as an adult

Table 7 (cont'd)

*Information Sought by Adolescent Males' Interviews*

Question	Purpose
Describe your participation in social events, community groups, or organized sports.	Understand the boy's civic character
How often do you have regularly scheduled physical activity in school or outside of school?	Does the school system cater to boys neurobiological need for physical activity
Are you curious about the world around you: community / society? The natural world?	Understand the boy's intellectual character

Assent and Interview Script.

### **Data Collection Procedures**

Given the distribution of participants throughout Ontario, it was decided by the researcher to conduct all interviews by telephone, thus providing a consistent data collection medium for all interviews. All interviews were audio recorded using a speaker phone at the researcher's home office. The Audacity Version 2.0.2 software package was used for digital audio recording. A backup digital audio recording was made simultaneously using the Blackberry Playbook Voice Notes application.

The audio recordings were transcribed by a transcription service. Transcribers were required to sign a confidentiality and non-disclosure agreement. The transcripts were prepared in Microsoft Word format (\*.doc).

### **Data Analysis**

All data based on responses to open-ended questions was analyzed according to the procedures described in the researcher's M.Ed. thesis (Tierney, 2011) and a journal article which describes a generalization of the initial work (Tierney, 2012b). That article is included as Appendix I. Since the publication of that article, the method has been given the initialism QDANG—qualitative data analysis using natural language processing and graph theory. This method combines coding—breaking qualitative data into concepts and assigning codes and categories to those concepts—with natural language processing (NLP) and graph theory to develop themes within the data. The IBM SPSS Text Analytics for Surveys (TAS4) was used for the NLP aspects of the data analysis. Graph analysis was performed manually by the researcher. Tierney (2012b, pp. 181-182) describes the

steps in the generalized procedure:

1. Transcripts were created from audio recordings of the interviews.
2. The transcripts were dissected to identify single concepts. Concepts are usually a single sentence or several sentences centred around a single idea.
3. The concepts were entered into a single electronic spreadsheet file, with each concept in its own cell.
4. Identifiers, unique codes for each interviewee, and demographic data were added for each concept.
5. Once completed, the spreadsheet file was imported into TAS4.
6. TAS4 processed the interview data using natural language processing to identify keywords within each concept/quotation.
7. Following that analysis, categories with names meaningful to the study were created. Some categories were created automatically by TAS4, others by the researcher. Categories are not mutually-exclusive. Multiple categories can be applied to a single concept if appropriate.
8. Categories were assigned to each concept in two ways: automatically assigned to some quotes by TAS4 or manually by the researcher.
9. If a category is improperly assigned as a result of the NLP, that quote was removed from the category
10. From all the categories developed from the initial analysis, the researcher identifies the first-order categories (Tierney, 2012b, p. 180). In the case of this study, first-order categories had an assignment frequency—the number of times it

was assigned to a concept—100 or more. In the parent interviews, second-order categories had an assignment frequency between 99 and 10.

11. TAS4 creates category graphs, or category webs as they are called in the software, which gave a pictorial representation of each of the first-order categories and their associated second-order categories.

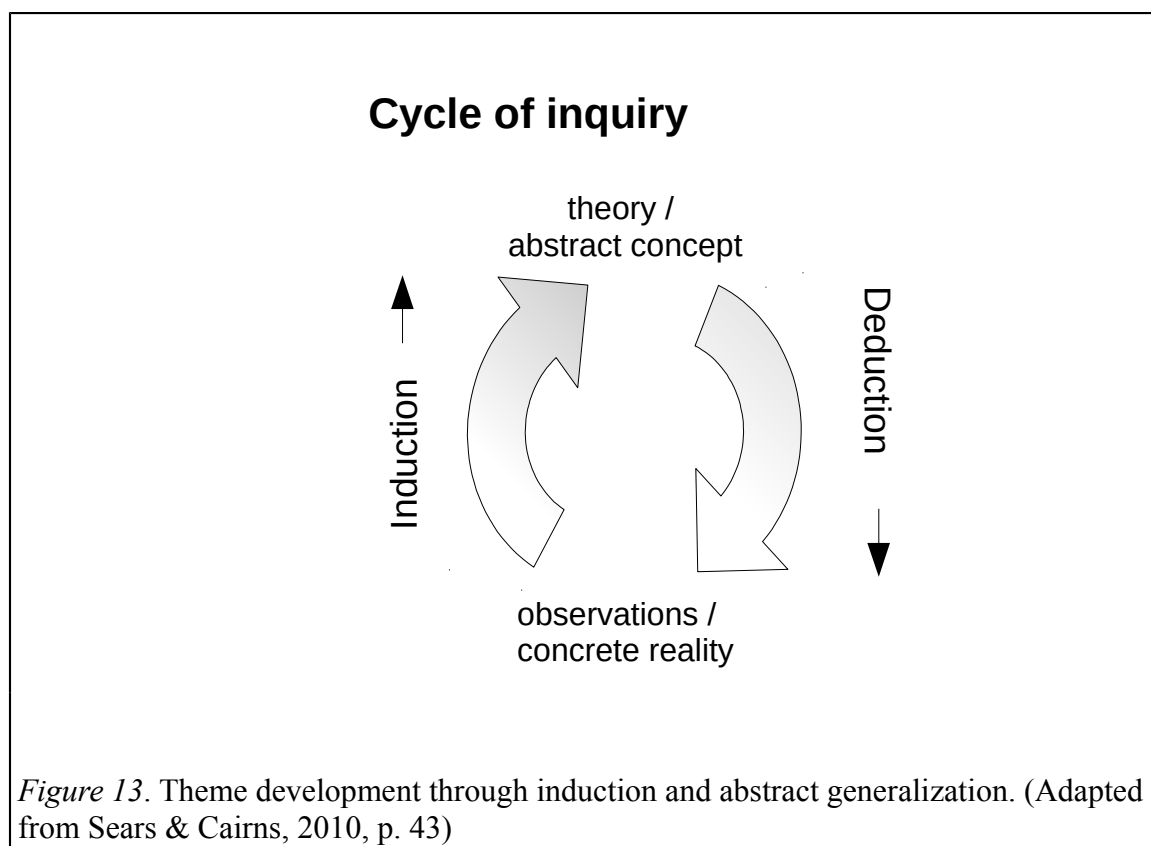
Final theme development uses hermeneutic methods—the in-depth inquiry into text and relating its parts to the whole to reveal deeper meanings—as described in Riessman (2004). Sears and Cairns (2010, 43) describe this process as taking concrete reality—in this case, interview data—and, through induction, generating theory to explain specific phenomena. Figure 13 illustrates this interpretive process.

### **Reliability and Validity**

*Reliability* has different meanings as it pertains to quantitative or qualitative research. In quantitative research, reliability is the consistent, dependable measurement of a phenomenon wherein the results are identical when measuring that phenomenon under identical conditions. One of the keys to achieving quantitative reliability is to remove, or at least control for, extraneous factors that could influence results. In other words, the results are *repeatable*. The ever-changing nature of qualitative research makes repeatability difficult beyond generalized themes.. Reliability in qualitative research takes on a different meaning, where the researcher is looking for consistency—not vacillating or being erratic in making observations over time (Neuman & Robson, 2012), and not necessarily repeatability (Smith, 2004).

For this research, reliability was addressed in several ways. Interview scripts were





developed to ensure that the same questions were asked to all participants. However, the conduct of the interviews did not adhere solely to script, thus permitting exploration of issues as they spontaneously arose. The interviews were all conducted by telephone thus providing a very similar environment for all participants as well as being in the comfort of their own home. Finally, the data analysis software, which used natural language processing, provided an initial level of objectivity and consistency that might not have been available had the analysis depended solely on induction.

All participant data is self-reported which could call into question the reliability of that data. “Self-report is the primary means of gaining access to information on an individual's internal processes such as feelings. Information on a person's social situation and home environment is usually elicited via self-report during a[n]...interview” (Fleming, 2010, para. 2). Hindelang, Hirschi, and Weis (1981) found that, in interviewing adolescent males with regards to delinquency, the reliability of the data was context dependent; in their case, race. In measuring delinquency, data from members of generally not seriously delinquent populations were found to be reliable.

In conducting the interviews for this study, there was no reason to suspect that any of the participants were untruthful. Nonetheless, given that the interviews were conducted by telephone, it is impossible to know if there were any external influences on the young men during their interviews.

Quantitative *validity* means that the researcher is measuring what was intended to be measured for a given variable. Qualitative validity, like reliability, is more difficult to confirm. The goal of the qualitative researcher in validating their research design is to

ensure that “a candid portrayal of social life is true to the experiences of the people being studied” (Neuman & Robson, 2012, p. 113). Tables 6 and 7 associate the variable or phenomenon being studied with each interview question.

### **Ethical Considerations**

*The Tri-council Policy Statement: Ethical Conduct for Research Involving Humans* (Canadian Institutes of Health Research [CIHR], Natural Sciences and Engineering Research Council of Canada [NSERC], & Social Sciences and Humanities Research Council of Canada [SSHRC], 2010; hereinafter referred to as TCPS2) requires that all research involving humans, conducted by institutions eligible to receive and administer research funds from CIHR, NSERC, and SSHRC, adhere to practices set forth in TCPS2 which includes policies on research integrity, peer review, and conflicts of interest (TCPS2, pp. 5-6). In compliance with this requirement, all recruiting artifacts and research instruments used for this study were submitted to Brock University's Research Ethics Board (BUREB). Approval was issued under File 12-202. Following are specific issues that were addressed.

**Recruiting.** The study required working with parents and adolescent male students. It was important that potential participants feel that no pressure existed for them to participate in the study. Any perception of a power relationship had to be avoided, thus third parties were used to assist with recruiting. Prospective participants were contacted by the third-party (i.e., Ph.D. program colleagues or the researcher's spouse) to determine if they would be interested—or at least willing—to be interviewed. If they were, the participant's contact information was given to the researcher so that an interview could be

scheduled.

**Informed consent.** Prior to participation in the study, all potential participants, and their guardians in the case of minors, were sent a Letter of Invitation accompanied by consent forms, which were to be signed prior to their interview. In the cases where an electronic version of the signed consent form could not, or had not, been returned, the stipulations of the consent forms were read to the participant, followed by asking him/her if they understood and accepted those provisions. The exchange was recorded.

Stipulations in the informed consent form included:

- The existence of the research was known to Brock University's Faculty of Education and Faculty of Graduate Studies and the final research paper will be publicly available.
- No personally identifiable information would appear in any documents or reports derived from this study.
- The confidentiality of participants was assured. No actual names would ever appear in any document or results, only pseudonyms.
- All data collected would be kept strictly confidential and would only be available to the researcher and the research supervisor.
- The interview would be digitally audio recorded.
- The participant gave their consent to participate in this study when he/she took part in an interview.
- It was understood that participation in this study was entirely at the participant's discretion.

- In the case of participants from the learning centre, they were further advised that choosing to participate or not to participate in the study would not affect their current or future relationship with the learning centre.
- The participant could decline to answer any question.
- The participant could withdraw from the study at any time. If he/she withdrew from the study after the interview, he/she was required to contact either the researcher or the research supervisor. Any audio recordings of his/her participation would not be used in subsequent analysis. Those recordings and any transcriptions of those responses would be permanently destroyed.

**Privacy and confidentiality.** Only pseudonyms were used to further ensure privacy. No reference was made to participants in any reports or other documents produced from this study that could enable their identification.

**Data archiving.** There is no intention to destroy the collected data. At all times, both during and following the completion of the study, all data was, and will be, accessible to only the researcher(s). Electronic data, including digital recordings, will be kept on password protected computers. Data on physical media, such as paper-based documents and recording media such as CDs and DVDs will be kept in locked filing cabinets or other secure physical storage. Any documents which contain the true identity of participants will be kept separate from the data themselves.

## **CHAPTER FOUR: RESULTS**

This chapter begins with a review of the purpose of the study and the research questions, followed by results from the analysis of the qualitative interviews. Trends and themes are presented at the end of the chapter, with discussion of the study results provided in Chapter 5.

### **Review of the Purpose of the Study**

The study's purpose statement and research questions are repeated here to reinforce their relationship with the study's findings. The purpose of this exploratory qualitative study was to understand the perceptions of adolescent males and their parents as factors influencing the young men's academic performance. Semi-structured qualitative interviews were conducted, addressing the following research questions:

3. What factors do parents believe affect their sons' secondary school academic performance?
4. When they do, why do adolescent males choose behaviours that impede their academic achievement?

### **Data Collection and Categorization**

Approximately fifteen hours of interviews were recorded for this study. Transcripts for all interviews were prepared by a third-part transcription service. In order to prepare the data for QDANG analysis (Tierney, 2011), each interview was first broken down into single concepts—portions of sentences, full sentences, or small paragraphs each containing a single idea. All parent interview data were consolidated into a single electronic spreadsheet as an intermediate step for using the IBM SPSS text Analytics for

Surveys Version 4 data analysis software. The data from the adolescent male interviews similarly were treated. The information from Tables 3 and 4 were also added to assist with in-depth analysis.

### **Parent Interview Categories**

The categorization analysis on the 767 concepts in the parent interview data were assigned 34 categories: 6 (17.6%) first order categories (frequency  $\leq 10^2$ ), 17 (50%) second order categories ( $10^1 < \text{frequency} < 10^2$ ), and 11 (32%) third order categories ( $10^0 < \text{frequency} < 10^1$ ). Detailed information on these categories is included in Table 8.

Many of the second- and third-order categories created during the analysis were generated by the natural language processing (NLP) engine of the TAS4 software. The first-order categories were created manually by the researcher and correspond directly to the major question clusters in the interviews. Each of these first-order categories aggregates a number of sub-categories; however, given the non-exclusive nature of those subcategories with the aggregation category and the assignment of categories through NLP, the sum of frequencies of categories and subcategories will usually be greater than the frequency of the higher-order category.

Table 8

*Parent Interview Data Analysis Category Frequencies*

Category	Frequency	% of All Responses
All Response	767	100.0
First-order Categories		
academics	194	25.3
noncognitive skills	141	18.4
teachers	133	17.3
character	115	15.0
school administration	102	13.3
Second-order Categories		
physical activity & sports	89	11.6
literacy & numeracy	71	9.3
attitude toward school	69	9.0
importance of PSE	61	8.0
6.3		
male teachers	47	6.1
reading	43	5.6
career	36	4.7
mobile	28	3.7
school support	20	2.6
sociability	16	2.1
teaching boys	16	2.1
curriculum	14	1.8
structure	13	1.7
creative	10	1.3
Third-order Categories		
importance of enrolment decline	9	1.2
awareness of enrolment decline	7	0.9
motivation	6	0.8
socioeconomic status	6	0.8
peer pressure	5	0.7
future study	4	0.5
stress	4	0.5
ignore	3	0.4
single gender classrooms	3	0.4
dialogue with parent	3	0.4
equity	1	0.1



### **Adolescent Male Interview Categories**

The categorization analysis on the 547 concepts in the adolescent male interview data assigned 32 categories: 4 first-order categories (frequency  $\geq 10^2$ ), 15 second-order categories ( $10^1 \leq \text{frequency} < 10^2$ ), and 14 third-order categories ( $10^0 \leq \text{frequency} < 10^1$ ). The adolescent male interview code frequencies are markedly lower than the codes for the parent interviews due to the reduced amount of data. Where parent interviews averaged about one hour in duration, interviews with the young men averaged about 45 minutes in length. Detailed information on the adolescent male interview categories developed from the analysis of that data is included in Table 9.

In the same manner as the parent interviews, the first-order categories aligned with the major question clusters of the interview script. The non-mutual-exclusivity of the categories developed during the analysis of the adolescent male data will, as with the analysis of the parent interview data, cause the sum of the frequencies to be greater than the frequencies of higher-order.

### **Findings**

The sections that follow present the findings from the semi-structured interviews. The analytical approach looks at the data from the perspective of separate fields of study, as laid out in the literature review. The principal motivation for doing this as opposed to 15 separate narratives is that this study is more concerned about the lot of boys and young men generally, and much less about individual stories. By using a strategic essentialism lens—see the section in Chapter 2 on strategic essentialism—all adolescent males are represented by a single group and, simultaneously, fully recognizing the true

Table 9

*Adolescent Male Interview Data Analysis Category Frequencies*

Category	Frequency	% of All Responses <sup>1</sup>
All responses	547	100
First-order Categories		
academics	193	35.3
noncognitive skills	108	19.7
teacher	99	18.1
character	92	16.8
physical activity	68	12.4
Second-order Categories		
work	45	8.2
career	35	6.4
friends	28	5.1
time	24	4.4
society	23	4.2
people	22	4.0
school	16	2.9
mobile	16	2.9
learning	11	2.0
desire to attend pse	10	1.8
assignment	9	1.6
religion	9	1.6
physics	7	1.3
college	6	1.1
literature	6	1.1
projects	6	1.1
team	6	1.1
Third-order Categories		
male	4	0.7
employees	3	0.5
geology	3	0.5
psychology	3	0.5
crime	3	0.5
geometry	2	0.4
health and well being	2	0.4
future study	1	0.2

<sup>1</sup> Order based on percent rather than frequency value

heterogeneous nature of its members (Gosse & Arnocky, 2012).

Results are presented on the major investigation areas of the study: noncognitive skills; aspects of character; physical activity issues surrounding the young men; literacy and numeracy; the influence of male teachers; and curriculum preferences. For most of the areas of investigation, the results from the parent and adolescent male interviews are presented separately. The category graphs associated with each investigative area are presented together. A top-level description of the significant relationships of each category graph offers an initial interpretation of those maps which will be used to inform the detailed discussions in the context of adolescent males' academic performance and the decline in male enrolment in higher education in Chapter 5.

### **Awareness of the Decline in Male Enrolment in Postsecondary Education**

In order to address any issue, an attempt at redress is predicated on an awareness of that issue (Prochaska, Norcross, & Diclemente, 1995). Therefore, each parent interview began with questions attempting to ascertain his or her awareness of the decline in male enrolment in colleges and universities. Although some of them had heard reports in the public press about boys' and young men's general difficulties in school, most were unaware of the current state of male enrolments in higher education. June's comment typified the parents' awareness of issue: "Not until I talked to you...now I hear it in the news all the time." Melanie explained that, although she was not aware of the decline in male enrolments per se, she has "seen a pattern [with her other sons], it just keeps happening."

Other parents knew, to varying degrees, of the existence of the young men's

difficulties entering university. Martin, whose wife is a teacher, recounted that, prior to learning about this study and only having recently read an article on the issue in the *Globe and Mail*, he was not aware of the declining enrolment issue. Stan, whose son Mark goes to a learning centre, told of ongoing conversations with the centre director. “I have heard references to it over the last number of years and of course, [the director of the learning centre] and I have talked multiple times and so, he has brought it to light in a more alarming fashion.” Cheryl's role as a senior administrator in a postsecondary institution provided her with knowledge of the issue: “I am aware of [declining male enrolments] from some research that I have read...that largely enrolment is more weighted towards females.”

The primary interest here is the general lack of awareness of the decline in male enrolment in colleges and universities amongst these middle-class parents of a situation that may directly affect their sons' lives and livelihoods for decades. Reports and discussions about the issue in the public press do not appear to have piqued the interest these parents.

### **Importance of Declining Male Enrolments in Higher Education**

The importance of declining male enrolments in postsecondary education to the parents can be best described in their beliefs about the importance of their son gaining a postsecondary credential and the requisite skills that accompany such a designation. Irrespective of parents' awareness of the issue, those that accepted its existence saw it as a barrier to their sons' future socioeconomic prospects. Half of the parents interviewed did not have a postsecondary credential, but all recognized that a high school diploma is

generally no longer sufficient to build a comfortable life in a knowledge-based economy. In fact, a recent report from a Statistics Canada (2014) longitudinal study has shown that, over the over the period of 1991 to 2011, a male with only a high school credential will earn about \$750,000 less than a male with a bachelor's degree over their working life.

For example, with reference to two of the parent-son participants, Stan is a successful entrepreneur with a high school diploma who has also earned a business certificate. Stan insists that Mark will go to college or university. He and his wife, an X-ray technologist, are putting great effort into building Mark's capacity and ability to learn "so that he can proceed through secondary [education] and then [on to] postsecondary [education]. He will have a much better success rate [with a] postsecondary education."

Cheryl, through her perspective as a senior postsecondary educator and administrator, and, as a foster parent, saw the value of postsecondary education well beyond its financial returns.

It is important for me to consider [the decline of enrolments of males] as a postsecondary educator...looking ahead to the next generation. I worry that our males are not going to be adequately prepared to be equal partners in parenting relationships...Because [I have been a] foster parent, I see so many families where the male parent, whose children who have come into care, their education is typically inadequate.

### **Noncognitive Skills**

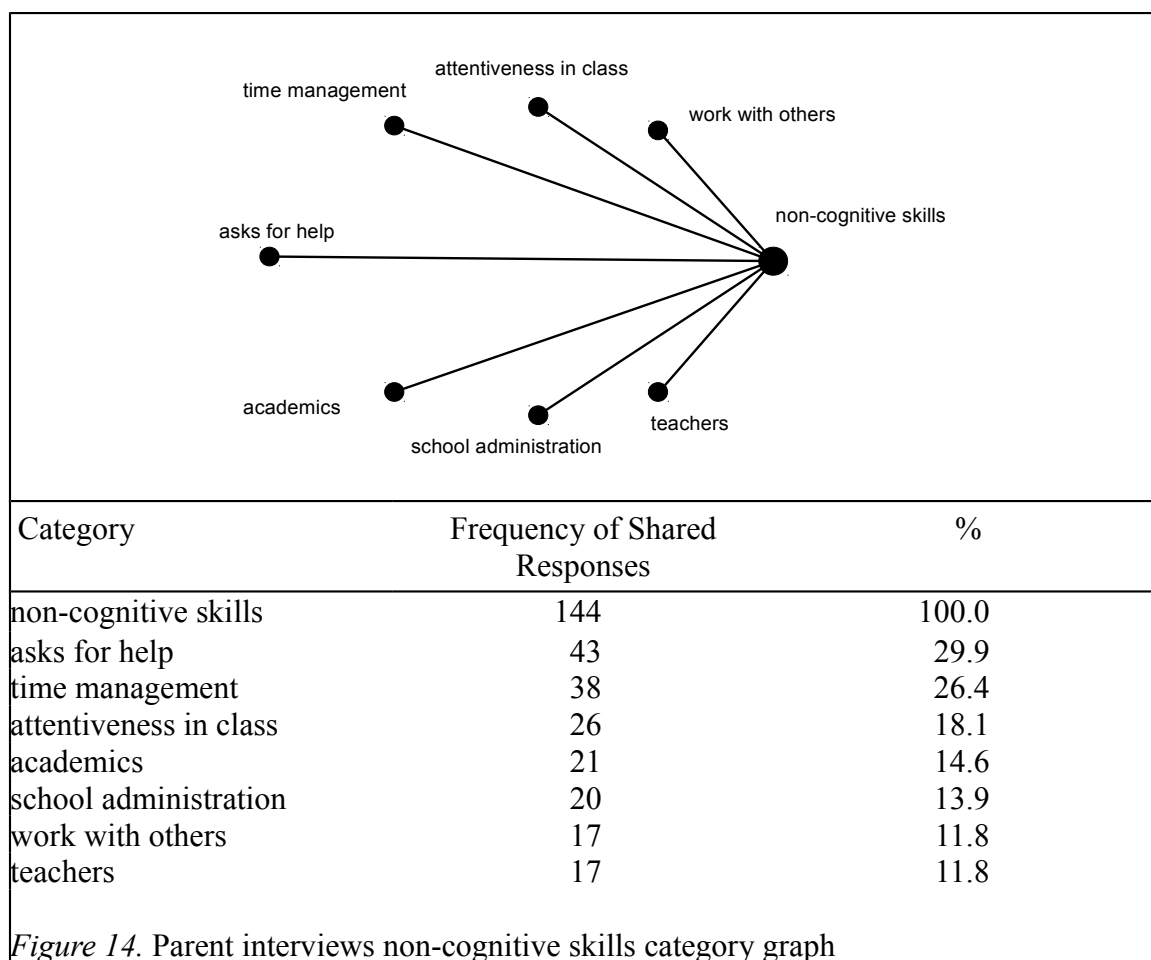
An examination and understanding of the role of noncognitive skills in young men's academic performance was one of the primary objectives of this research.

Following are the results of the analysis of the parent and adolescent male interviews with respect to specific noncognitive skills. The results of noncognitive skills as an aggregate as they affect the other areas of study are represented as part of the analysis of the remainder of the first-order categories (i.e., *academics, teachers, school administration, and character*).

**Parent interviews.** *Noncognitive skills* accounted for 141 (18.8%) of the total number of parent interview responses. The number of responses within that total for individual skills was: *willingness to ask for help*, 43 (26.9%); *time management/organizational skills*, 38 (26.4%); *attentiveness in class*, 26 (18.1%); *ability to work with others*, 17 (10.6%). There were 17 responses that did not relate to a specific skill, but were related to noncognitive skills generally. The parent interview noncognitive skill category graph is shown in Figure 14.

QDANG is a new analysis method developed by the researcher, thus most readers will not be familiar with some of its features, especially category graphs, sometimes called category maps. At the request of the defence committee, a description of the use of the category map follows.

Despite its outward appearance as a quantitative method—category frequencies ranked by “order” and the use of node-edge graphs—QDANG is a qualitative data analysis (QDA) tool. In the tradition of QDA, textual data, in this case from interview transcripts, is coded (i.e., the process of assigning tags meaningful to the researcher to segments of text). The difference between QDANG and other techniques is that QDANG uses natural language processing (NLP) for the initial pass through the data, similar to



open coding. This provides a deductive, repeatable aspect to the analysis. It must be mentioned that the software used for the analysis in this thesis—IBM SPSS Text Analytics for Surveys, V4 (TAS4)—does not use codes and categories in a manner typically found in qualitative data coding. It only uses non-mutually-exclusive categories. Not using exclusive categories eliminates the equivalent of the typical axial coding step. Once the automated NLP is complete, the researcher returns to data, fine tunes the categories assigned, and adds categories where the NLP engine was unable to assign a meaningful category.

Once the categorization is complete, frequencies of each category are determined and they are assigned an order (i.e., first-order, second-order, thirds order, and so on). The non-exclusivity of the categories means that a single piece of text can be assigned more than one category. This property permits the construction of the category graphs: a first-order category node is connected to its first-degree (i.e, directly connected) nodes. The category map then becomes a visual aid to assist the analyst with the induction of meaning from the data. Combined with a specially constructed assistive spreadsheet built from a data dump from TAS4 (see Figure 15), the results of the qualitative data analysis are made much richer when compared to other methods.

***Willingness to ask for help.*** Most of the parents perceived that their sons were not willing to ask for help, whether from their teachers or parents, with their schoolwork—material covered in class—or with homework. The degree of this perceived unwillingness to seek help and parents' understanding of the reasons for this behaviour varied considerably. June indicated that Jonathan never asks for help but she could not explain



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		Participa	Data	non-cognitive skills	non-cognitive skills / asks for help
294	293	Melanie	At home, he is [willing to ask for help]. I do not know about the classroom. [willingness to ask for help]	true	true
295	294	Melanie	knowing his nature, I could see him sitting back rather than actually asking. [willingness to ask for help]	true	true
296	295	Melanie	It would not occur to Charles to not ask a question or get some help because he might look stupid [willingness to ask for help]	true	true
297	296	Melanie	He would be the guy who does ask because he wants to know. [willingness to ask for help]	true	true
298	297	Melanie	There was a big difference between when he was in the public school versus the catholic school? [willingness to ask for help]	true	true
360	359	Ruth	[His willingness to ask for help with his school work is] Poor. [willingness to ask for help]	true	true
361	360	Ruth	No [I do not know why he is unwilling to ask for help.] I've asked him that many times and um he gave me a couple of different answers - he just says for the most part he's afraid to ask but he just doesn't say why. [willingness to ask for help]	true	true
362	361	Ruth	I'm not sure [if there's any kind of peer pressure in play there] [willingness to ask for help]	true	true
420	419	Martin	I think he is good at [being willing to ask for help]. [willingness to ask for help]	true	true
421	420	Martin	He recognizes when he does need assistance and he usually asks either myself or you know can I get my hand.. this last round of examination that he just finished he asked me to help in study so that is a good example of you know willingness to ask for help. [willingness to	true	true

Figure 15. Qualitative analysis assistive spreadsheet for *noncognitive skills*

his apparent intransigence which she also reported. Jaimie described Ben as not wanting to be different than his peers. Asking for assistance in any way would make him stand out. Ruth indicated that Walter was afraid to ask for help. However, she said that herefuses to elaborate his reasons. Stan described Mark's willingness to ask for help as weak, suspecting that the motivation is such that requests would be followed by the need to do extra work to build up a greater understanding of the material. In some instances, shyness was offered as a possible explanation.

Marg believed David had no issues with getting assistance with his schoolwork but, as with other aspects of his academic work ethic, he leaves it to the very last minute. Martin was the only parent who believed that his son had no qualms about asking for help, and actually did so on a number of occasions.

***Time management/organizational skills.*** Time management and organizational skills amongst most of the young men were generally perceived by their parents to be poor, or mediocre at best. The young men's inability to organize themselves, in the view of their parents, is most acute when it comes to doing homework assignments and projects. Stan was so frustrated with Mark's inability—or unwillingness—to manage his time that he started programming the calendar in Mark's smartphone to generate reminders for due dates, exams, and other activities requiring advance planning. Other parents reported that they were left scrambling to help their sons make a due date, often at the very last minute. Only George appears to have developed the skills necessary to balance school with the other demands in his life, according to his father.

The roots of this inability to plan may be due to undeveloped executive skills.

Several parents voiced concern about their sons not being taught how to organize themselves to complete a project due several weeks or more in the future: they are not being taught how to organize completion of their deliverables in a sustained but manageable pace. Ruth was concerned that, with the trend in reduced homework, the young men's organizational skills—as minimal as they may be in her eyes—will be lost entirely.

The ability or inability to plan does not appear to carry over to the young men's responsibilities in connection with their involvement with organized sports. All of the parents recounted that it was not necessary to remind their sons about making room in their daily activities for practices, games, acquisition of equipment, etc.

***Attentiveness in class.*** Parents described their sons' level of engagement in class as directly related to their interest in the subject matter and the teachers' ability to teach. In some cases, the behaviour of classmates caused the young man to be distracted or inattentive in class.

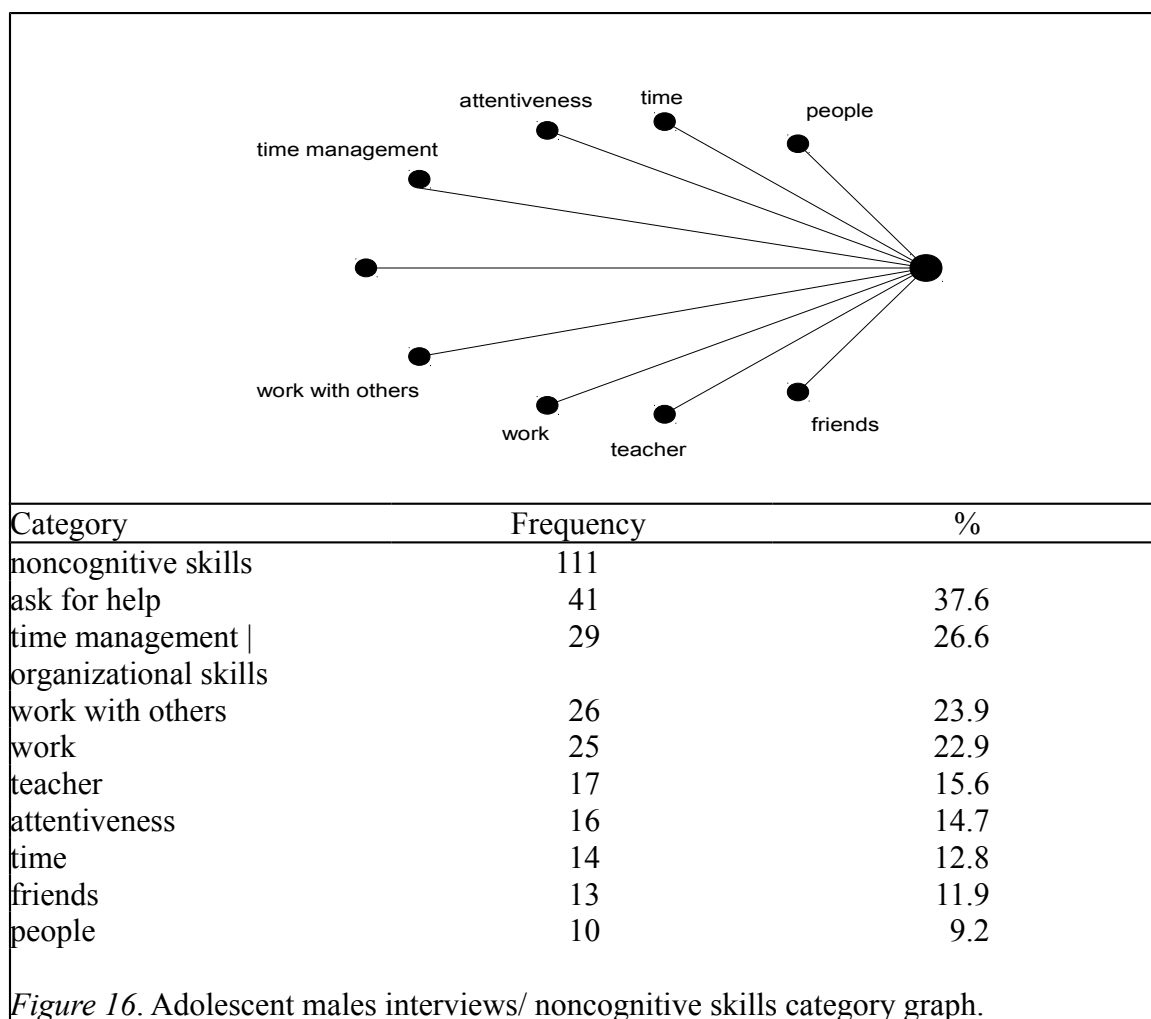
***Ability to work with others.*** According to their parents, most of the young men appeared to be working well within groups. However, Stan believes Mark's motivations are selfish: he pushes hard to get the work done quickly so that he doesn't have to worry about it at a later time.

**Adolescent male interviews.** *Noncognitive skills* accounted for 20.3% (112) of the total number of adolescent male interview responses. The number of responses within that total for individual skills was: *willingness to ask for help*, 41 (36.9%); *time management/ organizational skills*, 29 (26.1%); *ability to work with others*, 26 (23.4%);

*attentiveness in class*, 16 (14.4%). In all, 112 responses were associated with specific noncognitive skills. There were no responses that did not relate to a specific skill nor were there any responses that were categorized with more than one skill. The adolescent male noncognitive skill category graph is shown in Figure 16.

***Willingness to ask for help.*** The young men's willingness to ask for assistance with schoolwork or homework varies considerably, according to their self-reports. None of the males expressed a fear of negative perception by their peers. In their view, one never asks for help because if one believes that the teacher cannot teach the material adequately in the classroom, there's no point in asking the teacher one-on-one at a later time. They believe that the teacher will, in all probability, use the same approach as in class, which they did not understand in the first place. Walter commented that his math teacher simply refused to help him, offering the explanation that he did not have the time. It is not known if this was a single or a recurring event. Bob's comments centred on the differences between the Catholic school board to which his school belongs and his previous experiences in a public board. He found the teachers at the Catholic school board were much more open and willing to provide extra assistance whereas he found the teachers at the public board not helpful at all. Bob also found that the workload at the public school, both in school and homework, was kept to a minimum, thus negating the need to request any assistance.

***Time management/organizational skills.*** With the exception of David, who recognizes in himself a tendency to procrastinate, the young men believe that their time management and organizational skills are, on the whole, adequate. There is a stark



dichotomy between how the parents and their sons perceive the young men's ability to organize their lives. Most of the parents recounted numerous efforts to help their sons get organized in submitting assignments and projects on time.

***Ability to work with others.*** In general, the young men did not report having difficulty working in groups. They found it easier to accomplish the objectives of assignments when they collaborate. Several of the young men mentioned that their contributions in group settings are often of better quality than when they work alone and that they tend to carry their proportionate share of the workload. In his case, David said this was probably due to his long involvement in team sports: he doesn't want to let his teammates down. Nonetheless, there were several specific situations where difficulties arose.

Jonathan found working with girls difficult. He also mused that girls had the same difficulty in mixed-sex groups. Several of the young men found it difficult working in groups that included their friends as there were too many distractions and they too often went off on tangents.

***Attentiveness in class.*** The young men's ability to remain attentive in class varied according to each individual. Jonathan commented on his difficulties remaining focused in class.

I have trouble paying attention in class... I always seem have to like keep doing something like you know like talking to someone...I am always shaking my leg, because I cannot sit still...I am very fidgety...if someone starts talking to me I never tell them to not talk because I am trying to listen and I usually always

talk...My mind is going a mile a minute.

George, Mark, and Charles recognized the need to pay attention in the classroom.

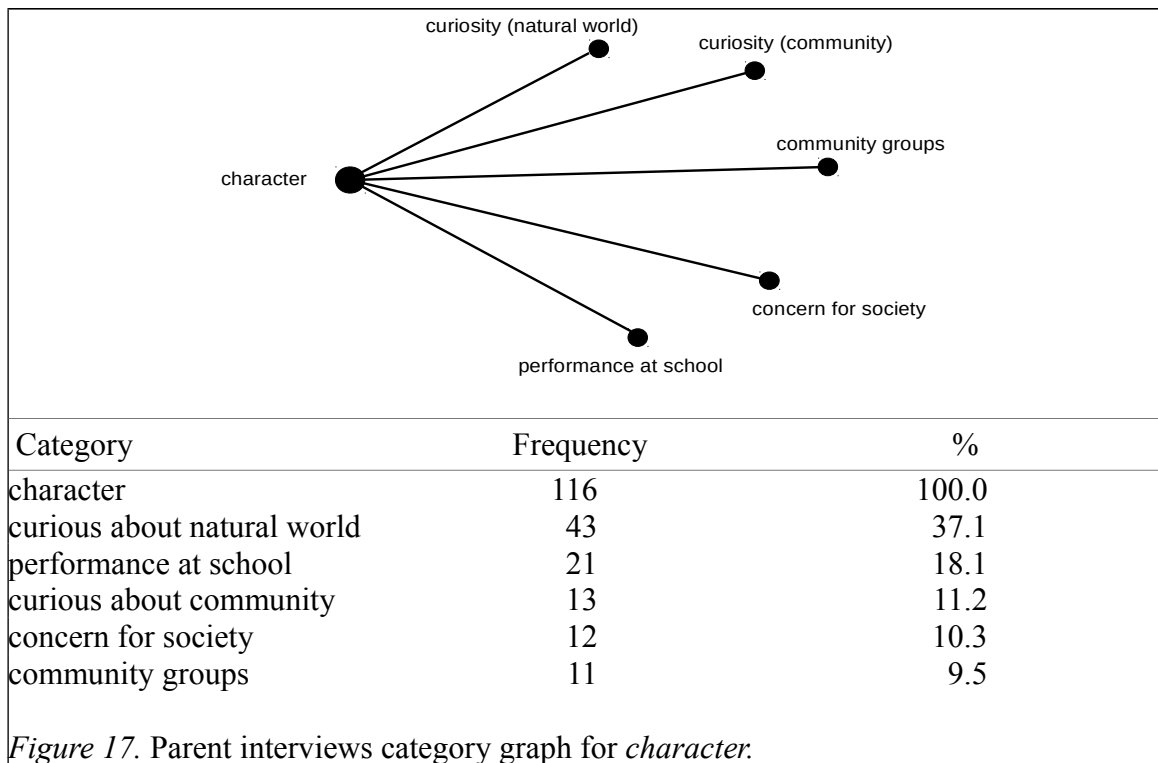
However, like the other participants, if they are not engaged by the material, they struggle to remain focused. Jonathan, Walter, and David spoke of their friends being a distraction in class.

### **Character**

Shields' (2011) model of character, centred on intellectual, moral, civic, and performance character, was used to frame a number of areas of inquiry in the semi-structured interviews. The parent interviews identified and/or affirmed the young men's behaviours. The interviews with the adolescent males provided the insight into the motivations for those behaviours.

**Parent interviews.** In the parent interviews, each form of character was associated with one or more categories. Intellectual character was associated with *curiosity in the natural world*; moral character with *concern for society*; civic character with the young men's involvement in *community groups* such as Scouts or Cadets; and, performance character with *performance in school* and *work ethic*. The parent interviews category graph for character is shown in Figure 17.

**Performance character.** Performance character covers general academic performance which includes grades, but covers the desire to do quality work, as well as meeting or exceeding the requirements of an assignment or project. As stated in Chapter 1, one of the limitations of the study is that all data were self-reported by the participants. No evidentiary support such as report cards was requested to confirm the young men's





academic standing. Additionally, no assessment of the cognitive ability of the young men was undertaken.

The range of performance levels at school for the young men is broad, according to their parents. Jaimie reported that Bob is getting Bs in geography and science which is very good for him. He works very hard to achieve this success. She did however report that Bob was struggling in math and English. Ruth reported that Walter is barely passing. She also mused that there may be some benefit in Walter repeating a year. Martin reports that George does well and “he has a good mind for remembering little pieces of information.” Marg is frustrated with David: he does satisfactorily in gym and courses that “make sense to him” like religion and psychology, but is getting Ds in math. June recounted that Jonathan is “just barely passing,” getting 50s and 60s and a couple of 70s. Stan indicated that Mark completed the eighth grade with an 80% average and also won a school letter for being “a well rounded student.”

Although some of the young men are doing reasonably well, with averages around 80% (A-), none of the parents' descriptions of their sons' performance in school could be described as the pursuit of excellence.

***Moral character.*** Only a minority of parents offered comment on their sons' moral grounding in terms of their concern for society. Marg described how disturbed David became after incidents of violence amongst the students at his school, with his observation that “everyone involved in the incident was brown.” June could only comment that “hopefully [Jonathan] would go out of [his] way regarding somebody they know that is being bullied.”

***Intellectual character.*** Curiosity about the natural world was used as an indicator of the young men's possible curiosity in subjects such as science and geography. Cheryl reported that JD was always interested in the various places throughout the world she travelled to as part of her responsibilities as a senior leader at a postsecondary institution. Jaimie reported that Bob was intrigued with the Canadian Arctic. Melanie described Charles as an “outdoorsy” type, but the depth of his curiosity about the natural world could not be determined. Martin believes George's interest in the natural world stems from living in northern Ontario. Marg stated that David does not seek out opportunities to engage with nature. Stan believes Mark would rather sit on the couch and play video games than interact with nature. June stated that Jonathan is simply not interested in such things.

None of the young men appear to be driven by any kind of strong curiosity in the natural world. Nor do they report engaging in any activities that have even a minimal scientific bent such as auto mechanics, carpentry, etc. Curiosity about “how things work” was not expressed. There was no evidence of self-motivation in pursuing activities that might indicate an intrinsic interest in science. They'll go camping or to a cottage in Newfoundland, for example, but only so long as someone else is encouraging them as was the case with Charles and Walter.

***Civic character (curiosity about their community/community groups.)*** None of the adolescent males reported an interest or curiosity about their community or society, although Jaimie said that Bob has already completed his required 40 hours of community service to graduate from high school (she did not offer any possible motivation for this

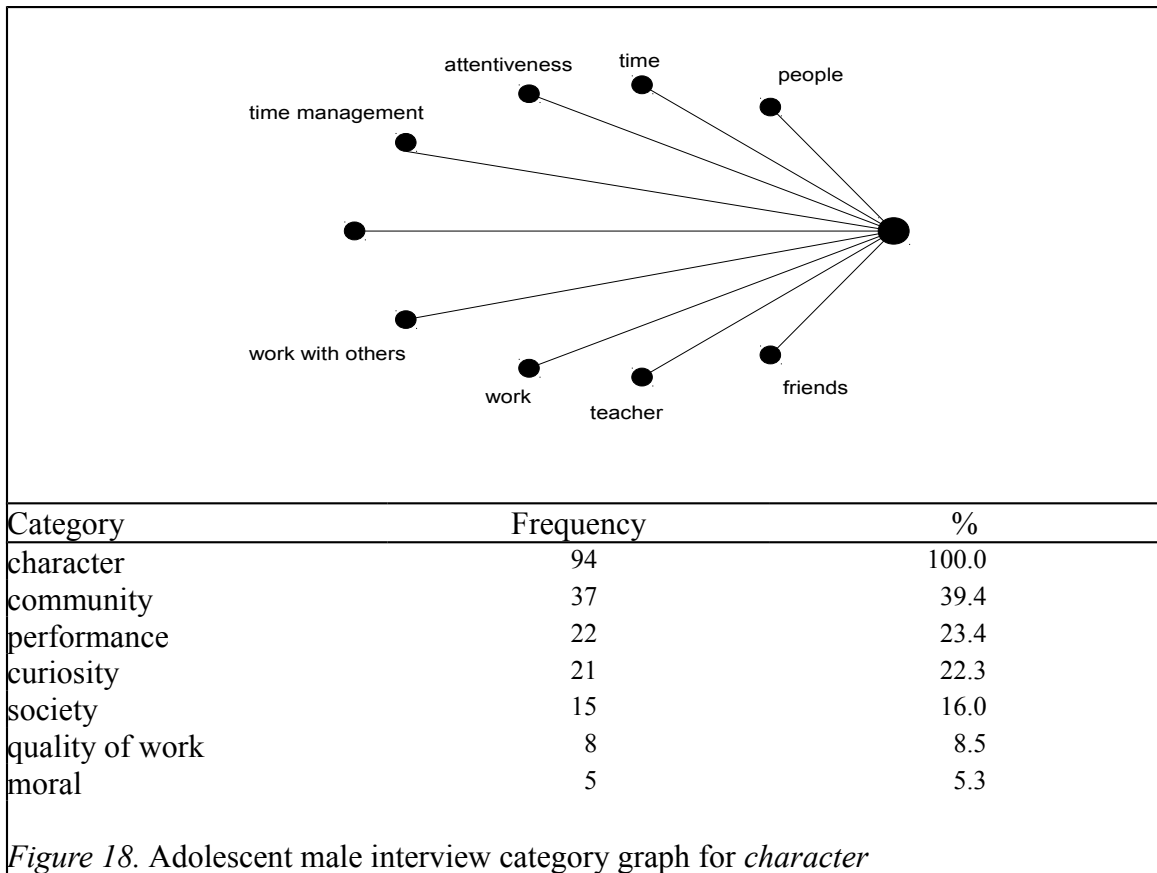
rapid progress). Except for JD, none has ever been involved in Scouts or Cadets.

**Adolescent male interviews.** Similar to the parent interview data, each form of character was associated with one or more categories. Moral character was associated with the *society* and *moral* categories; civic character with *community*; performance character with *performance* and *quality of work*; and, intellectual character with *curiosity* about the *natural world* and their *community*. The category graph for adolescent male interview data for character can be found in Figure 18.

**Civic character.** The level of involvement of the young men in the community varies. George participated in a student run program to develop leadership skills in other students. David began participating in a sports leadership program through his school in the fall of 2013. Charles has taken part in fundraising activities because, in his words, “I wanted to.” As previously stated, Walter has already completed his 40 hours of community service required to graduate from high school.

The level of community involvement of the adolescent males is believed directly related to their year-round involvement in organized sports. Several of them are playing at a very high calibre, sometimes requiring travelling to the United States (David) or Europe (Walter). Such time commitments, in tandem with the demands of school, do not leave much room in their schedules for community service.

**Moral character.** To better understand their moral character, the young men were asked how they might respond when witnessing bullying or to a hypothetical bullying situation. Interestingly, Jonathan has never witnessed bullying in his school, but did respond “I would care [about someone being bullied], I would try to help” in considering



his possible reaction to someone being bullied. Mark had the most to say on the subject of bullying.

Oh my gosh I could not stop caring...please don't even get me started about bullies...Yeah, [I would go out of my way to help somebody who is being bullied]. I saw the bully actually doing it then I do everything in my power to stop that bully from actually inflicting damage on the victim either mentally or physically. I would do anything in my power...Bullies are usually big people and they bully people because they know that. And they bully people with confidence because they know that nobody is going to mess with them because they are big.

***Performance character.*** The young men's overall academic performance covers a wide range, from an eighty percent average (Charles and Mark) to near failing (Jonathan). George was excited to say that "the report card coming up [will] probably be my best." It appeared that being on the cusp of an A- (i.e., 80%) was sufficient. Most were very aware of their academic performance and said they would prefer to be doing better. However, there was no clear evidence that any of the young men were striving for As or A+s.

The young men do have a sense of what constitutes neat work and make an effort to do so. But this must be reconciled with Mark's statements:

most of the time I do the best that I can do, I do not do work purposely to get a lower marks than what I can get...I am generally a very lazy kid.. I do not do too much unless I have to but my father makes me a list things to do, I will do that list top to bottom in the timeframe that he gives me to do [it].

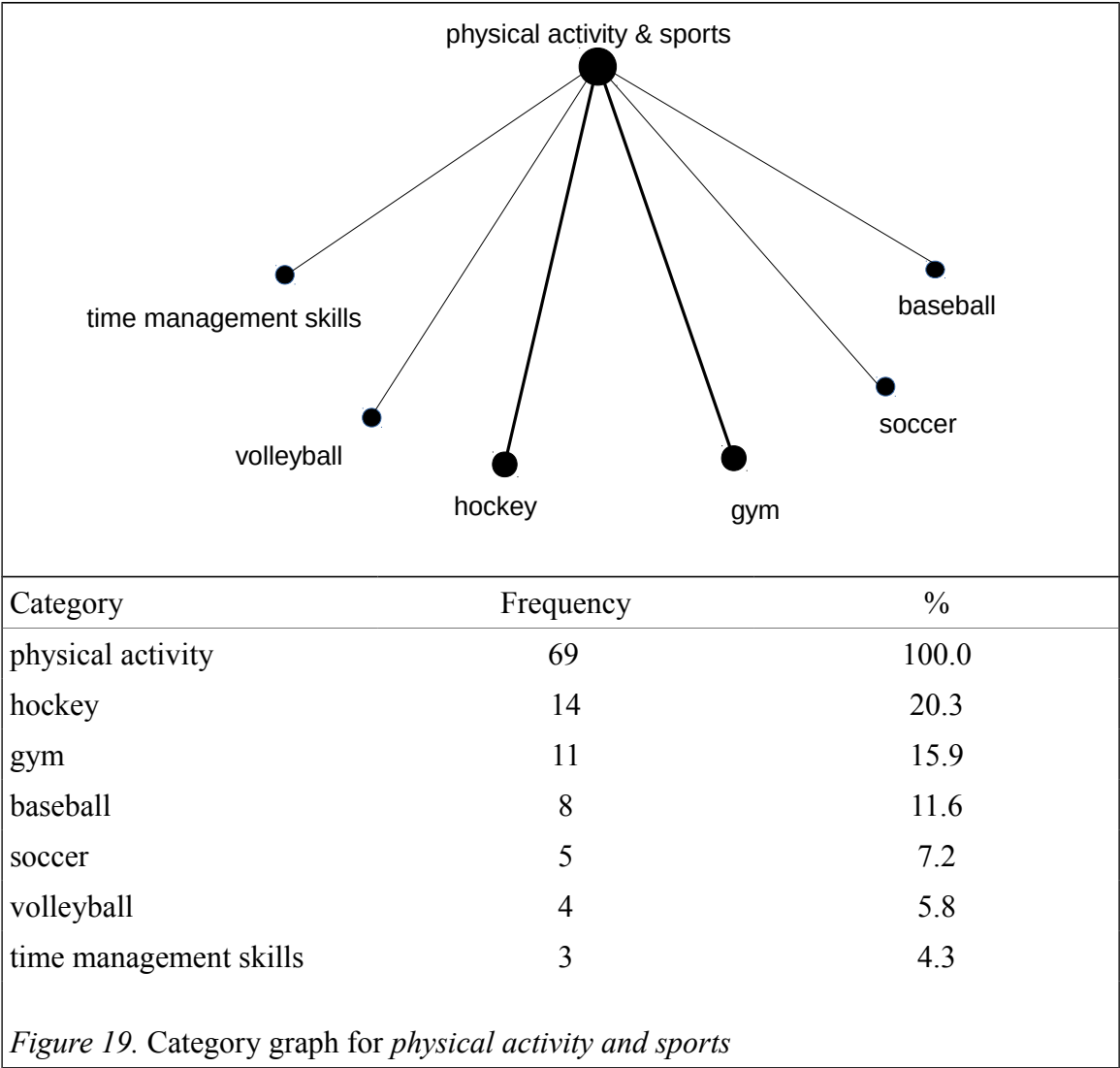
There did not appear to be any intrinsic drive to excel academically in any of the young men who participated in this study.

***Intellectual character.*** The young men were marginally more eloquent than their parents in describing their *curiosity about the natural world*. Although this may appear to be a narrow indicator of curiosity, it was a first attempt to understand their wider interest in the natural sciences. Several found the study of space and space travel interesting. Most enjoyed visiting wilderness destinations to observe fauna; Walter was fascinated by whales on one of his trips to Newfoundland with Charles and Charles' father. A fascination and sense of wonder with the natural world was not generally apparent from the discussions with the young men.

### **Physical Activity and Sports**

The level of the young men's physical activity was qualitatively investigated to better understand if a lack of physical activity negatively impacts their cognitive functions, as well other factors which may affect the academic performance such as their attentiveness in class and their ability to complete schoolwork and homework. Due to the similarity of the data from the parent and adolescent male data sets, the discussion of physical activity and sports is organized as a single data set. The category graph for physical activity and sports is shown in Figure 19.

In all of the cases, the young men who participated in this study were very active in organized sports, whether at school or in their community. This appeared to mitigate, for most of the young men, many of the issues commonly encountered when regular physical activity is not part of the school day throughout the school year (Bjorkland &



Brown, 1998; Pellegrini & Smith, 1998).

Two of the adolescent males did experience cognitive difficulties due to diminished physical exercise. Bob's lack of exercise—on days when exercise is not scheduled or inclement weather keeps students indoors—can interfere with his ability to “actually pay attention or get work done.” For Jonathan, although he is very active in hockey year round, he seems to be adversely affected by not having gym or a gym-like class available to him throughout the year. His is the only school amongst the study participants that does not offer alternative gym classes such as hockey or weight training as an elective. Bob takes a gym credit every semester. His mother did not indicate behaviors associated with lack of exercise during the school day.

Upon examination of the various sports in which the participants have engaged, it was noted that, except for one of the young men who has played golf with his father, they were all team sports (i.e., hockey, baseball, soccer, volleyball). As previously stated, David attributes his diligence in working with others on school projects to his sense of not letting down his teammates, which he believes he developed from many years of participating in baseball. The remainder of the young men all commented that they did not have difficulty working in groups

A number of the parents commented that, irrespective of their time management skills with regards to school work, all of the young men were able to organize themselves to be at practices and games on time, as well as undertake personal fitness and practice routines on their own.



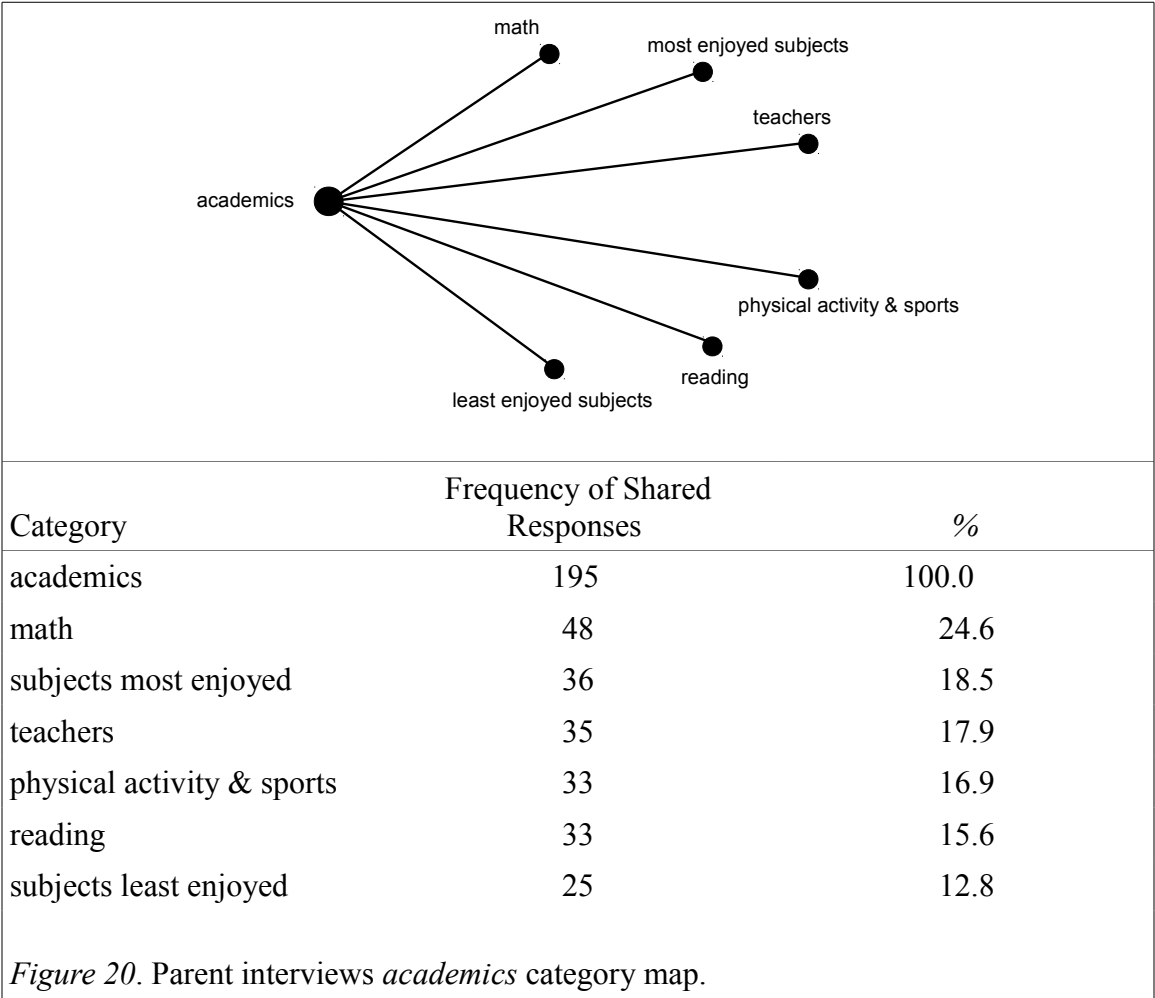
## Academics

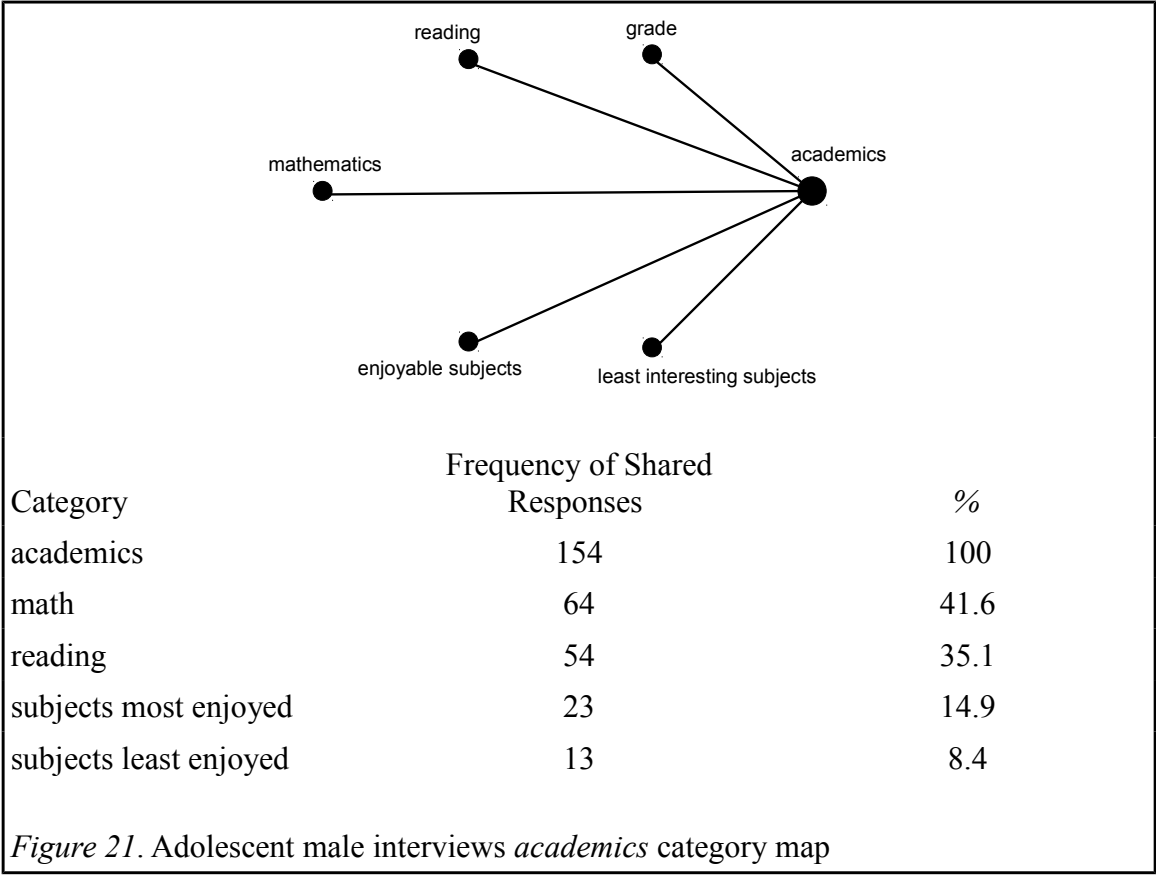
The *academics* category encompasses a variety of topics related to the young men's academic performance including: favourite and least favourite subjects, numeracy, and literacy as reflected in their desire to read, and the types of material they would prefer to read. The results from the parent and adolescent male interviews are presented together because of the near complete overlap of the responses from each group. The category graphs for academics are shown in Figures 20 and 21.

***Subjects most enjoyed.*** There was only one subject which all of the parents identified as enjoyable for their sons: physical education. Several of the boys were able to have at least one elective, in addition to their regular physical education class, that involved physical activity.

Other subject preferences were individualistic: one enjoyed history, several enjoyed science, and one mentioned math as one of his favourite classes. Marg thought David would have enjoyed sociology and psychology, but the teacher never distributed the textbooks, forcing the students to go to the library in their spare time (i.e., during lunch, after class). Martin was surprised that George enjoyed English class where the students studied a work from Shakespeare and also read, in Martin's words, "a heavy novel."

***Subjects least enjoyed.*** Mathematics was identified by 4 (57.1%) of the young men as one of their least favourite subjects. Given math's strategic importance in supporting the study of the natural sciences, engineering, and even commerce, it is discussed in its own right in a subsequent section.





Beyond math, there was no consensus among the young males on specific courses they found least interesting or just uninteresting. There were multiple choices in this regard: math (Bob, David, Walter, and Jonathan), English (Charles and Mark), French (Mark and George), science (David and Mark), geography (Charles, George, and Jonathan). Table 10 presents these dislikes in an attempt to identify a pattern.

**Math.** All but one parent recounted stories of their sons' attitudes to mathematics, ranging from indifference to outright hostility. Melanie's son Charles was the only participant who expressed an affinity for, and facility with, math. Some parents noted the generational difference in mathematics instruction: they were taught with the now frowned upon methods involving rote learning, as compared to the methods currently in use which include discussion and pattern recognition. They were puzzled that, with the new curriculum, came diminished academic performance, in their view, when compared to their own scores when they were in school.

Several parents remarked that although their son did not have any particular difficulty with mathematics, their indifference resulted in minimal effort being expended in completing math assignments and studying for math exams. The teachers who had the best success in stimulating the young men's interest and curiosity in math were the ones who used sports metaphors.

**Reading.** None of the parents reported any difficulties with their sons' reading abilities, although they did comment on the young men's reading preferences. All mentioned that their sons were not voracious readers. The young men limited themselves to reading mostly fiction and literary classics as assigned in school. Such reading patterns

Table 10

*Adolescent Males' Subjects Least Enjoyed*

Participant	<u>Subject</u>				
	Math	Science	English	French	Geography
Bob	•				
Charles			•		•
Walter	•				
David	•	•			
George				•	•
Mark		•	•	•	
Jonathan	•				•

may be precursors to behaviours found in older males, put so aptly by Martin: “Yeah, [I do not read fiction]... I never really have...I only read for information. My wife tries to convince me to pick up some novels, but I have never really done that.” (Martin's wife is a school teacher.)

When reading materials are assigned that are more to the liking of the young men, they appear to be more willing to read, according to their parents. Having decided that the novel *Hunger Games* was for girls, Bob was allowed to select another book—*Jesper*—for a reading assignment (Jaimie). June recounted that Jonathan generally finds reading boring, except for history, which he finds fascinating.

Discussions with the young men aligned with the parents' observations. Mark is “into the Darren Shan books” and was able to substitute one of those books for a reading assignment. However, if

somebody just hands me a book and says read it, chances are I am going to take like weeks to finish it....the actual reading of the words is easy, but staying with it and continuously reading the book will be hard for me because I will just get sidetracked so easily.

Mark prefers science fiction. “If somebody were to present me with something that I might enjoy, I would actually read it. If I enjoyed it and [it's] something that I [would] enjoy reading, then of course I will read it.” Bob's good fortune in having a teacher who was willing to adapt the curriculum for boys is not universal. His teacher made the change because there were more boys than girls in his class. Charles' teacher did not make an effort to assign books that both “the boys and girls would like.”

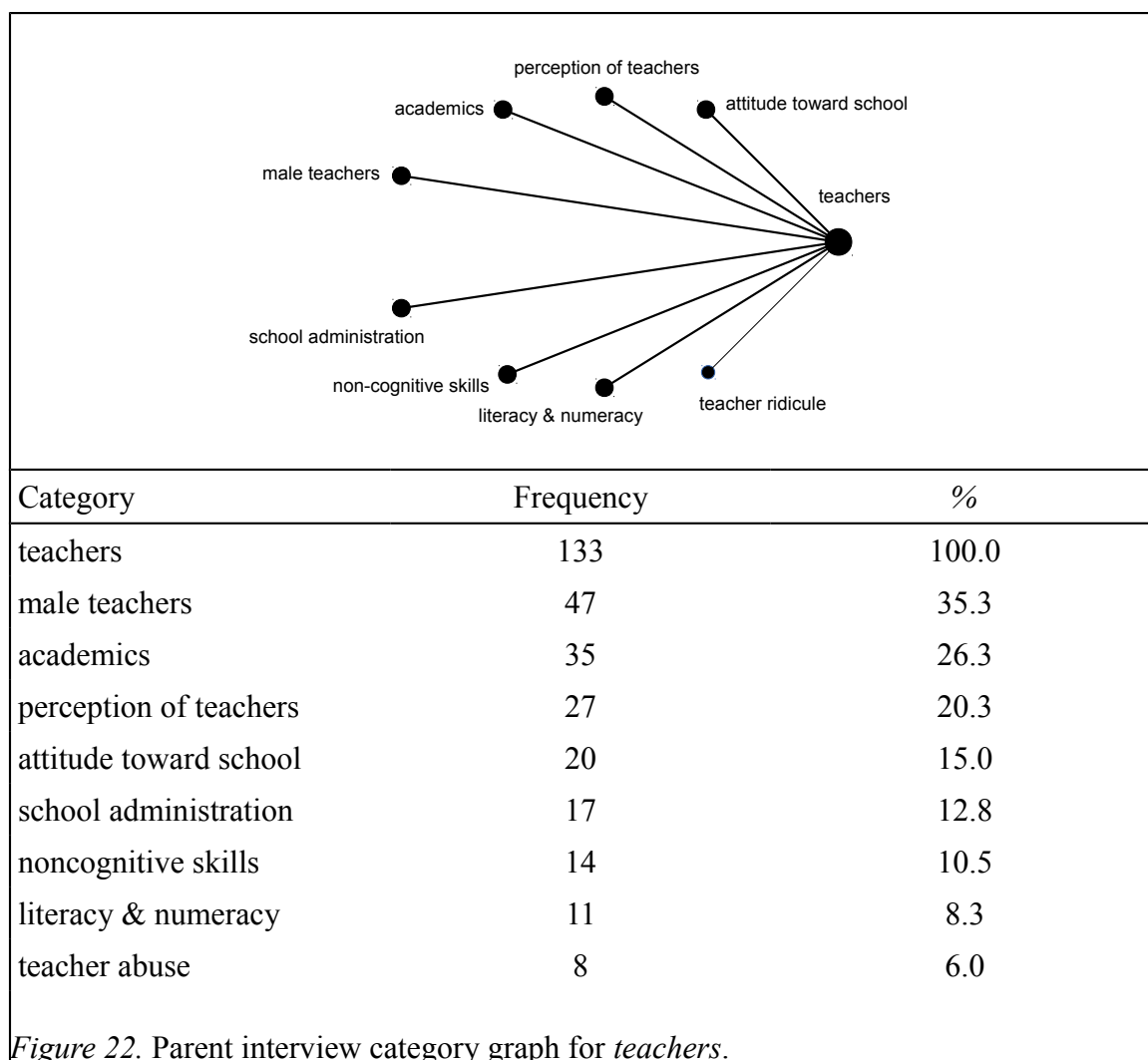
Several of the young men mentioned having just finished studies of various works by Shakespeare. They saw plays such as *Othello* and *Romeo and Juliet* being more for girls. None mentioned studying works that may have arguably been more interesting to boys, such as *Julius Caesar*, *Hamlet*, or *Macbeth*.

### **Teachers**

There were two primary lines of inquiry with respect to teachers: the young men's perceptions of their teachers, and, the young men's preference, or lack thereof, for male teachers.

**Parent interviews.** During this questioning, several additional issues arose, spanning the gamut from outstanding teaching and great care and concern for students to several teachers who ridiculed two of the young men in front of their classes. Figure 22 shows the parent interviews category graph for *teachers*.

**Perception of teachers.** Anecdotally, educators understand how individual teachers with a passion for their work can inspire students to excel, with their students becoming passionate about learning themselves. Several parents commented on how teachers were able to tease better academic performance from their son than they had previously thought possible. Jaimie commented that “[Bob] took science last semester but I thought for sure that [it] was going to be his most difficult subject...he did fairly well, but he loved it and the teacher was so amazing.” Martin explained how he has seen teachers be effective even in pedantic courses: “I see very dynamic teachers teaching what I would called dry subjects...the students are engaged and excited about those subjects only because the teachers are so dynamic and skilled.” These same parents





described other teachers their sons have had as “just horrible”, a “wet sandwich”, and the “teacher was just kind of coasting.”

Several parents commented on their sons' responses to how teachers present themselves and the material they are teaching. Martin noticed that the interest of students in school was directly related to the abilities and enthusiasm of the teachers.

***Teacher ridicule.*** Inconsistency is to be expected in any human endeavour. However, when dealing with vulnerable students, teachers' actions can have deleterious consequences. Jonathan was asked by his art teacher what he thought of one of his fellow student's project. Upon replying that he didn't know much about art, the art teacher excoriated him in front of the class, calling his response a “cop out.” Since that time, Jonathan wants “nothing to do with art.” Ruth recounted an episode when Walter's art teacher returned an exam on which he didn't do well. When the teacher gave it to him, she vocalized how poor he did to the class. Ruth thought about lodging a complaint against this teacher; apparently other parents already had. Charles' foster brother John had at one time demonstrated artistic talent and was registered in a community college art and design program until one of his teachers commented “I don't know why you are in this program.” From that point on, John became “very, very bitter” and could no longer be persuaded to pursue his passion for art.

***Male teachers.*** Most of the parents believed that their sons had no preference for male teachers. For some of the young men, the year they had just completed—for most of them it was grade 9—was the first time they had had a male teacher. Ruth did comment however that “Walter is more positive [with male teachers]...He has expressed that he

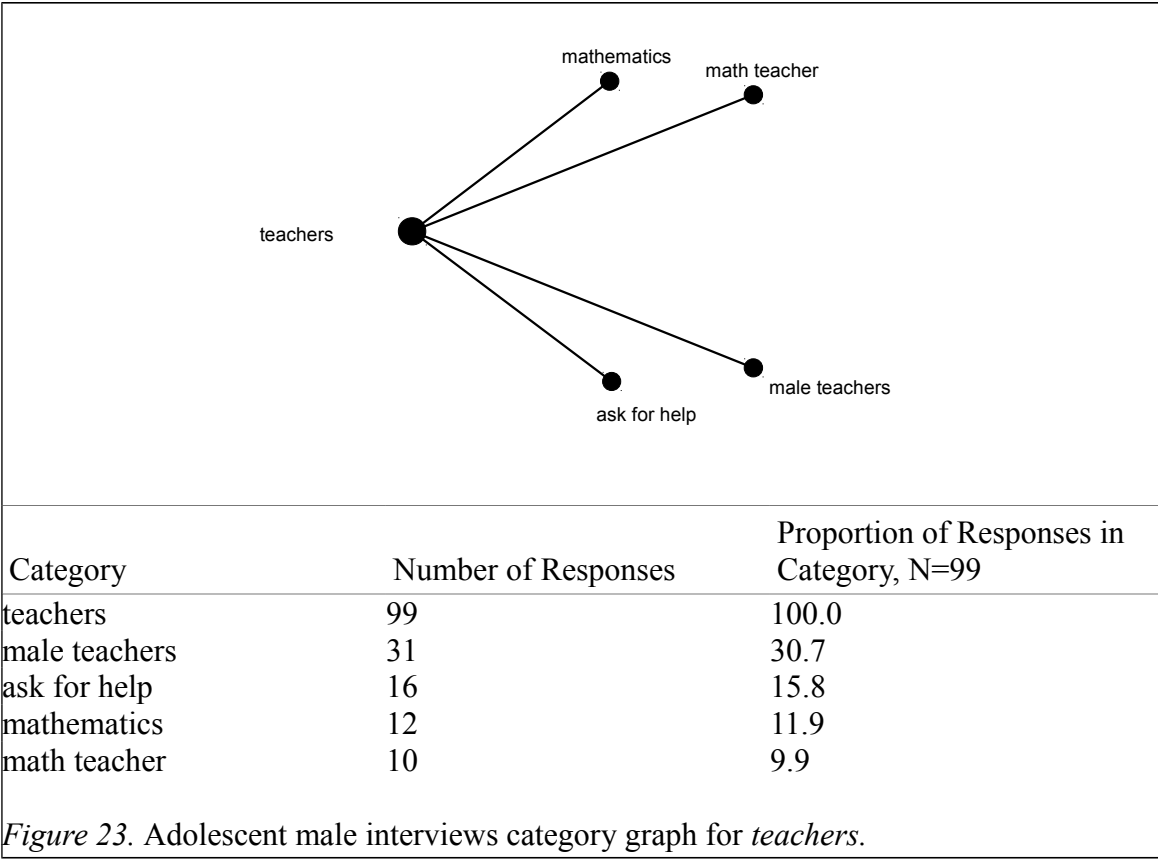
likes to have male teachers.” Jaimie was particularly effusive in describing Bob's experiences with his science teacher.

Mr. Baker [a pseudonym] is a young energetic cool like guy who did cool experiments and Bob said...he talked a lot and he did experiments a lot...[Mr. Baker] tries to take as much information as [he] can and relate it to sports. He always relates to football, hockey, or some kind of thing statistical.

June's comments about male teachers prompted the inclusion of several questions regarding the sex of teachers and how it might affect their academic performance. The literature advises that the issue is complex. Martin believes that “it is important that [George] sees male teachers and that he sees men with that level of education.” The parents also did not report any instances of their sons having difficulties with male teachers. However, each was able to report at least one instance of perceived girl-partisanship (Benatar, 2012, p. 14) on the part of female teachers.

**Adolescent male interviews.** When discussing their teachers, male and female, the young men were objective and straightforward in their assessment of them. Unlike with the parents, discussions did not go beyond general perception of their teachers, difficulties they've had with female teachers, and their preferences, if any, for male teachers. See Figure 23 for the category graph for adolescent male interview data on teachers.

***Perception of teachers.*** Most of the young men's comments regarding their teachers centred on teachers' attitude and ability or inability to teach, supporting the veracity of Martin's comment on teacher attitude. The following examples illustrate the



problem in the young men's own words..

*Jonathan.* Lot of teachers I do not like...just because. It is just the way they teach us. It is so like lazy and like my science teacher she just put notes up on the board and told us to copy it down and study for the test tomorrow and that is how the year went and it just got so repetitive and it was so hard to understand sometimes. There were lots of people in my class who just did not know what to do sometimes because she just never explained any of it. That is what a lot of my teachers do.

*David.* Science...I like some of it but like most of it's memorization—I don't really find I'm being taught anything—I feel like I just have to memorize it all....My Grade 10 [math teacher], he was like very old...he was kinda clueless but he was a nice guy.

*George.* He would just write down problems on the board and then he would solve them himself and then we would be expected to sort of do questions after that or just copy those down instead of him actually explaining the problems and like the actual method to do them.

*Walter.* There are some teachers that actually seem like they want to help and they want you to pass and meanwhile there are other teachers that seem like, that make it like, it's only up to you.

***Female teachers.*** Some of the young did have female teachers who they perceived as noticeably favouring female students or who were not tolerant of what the young men perceived as normal adolescent male behavior. Jonathan reported that he had

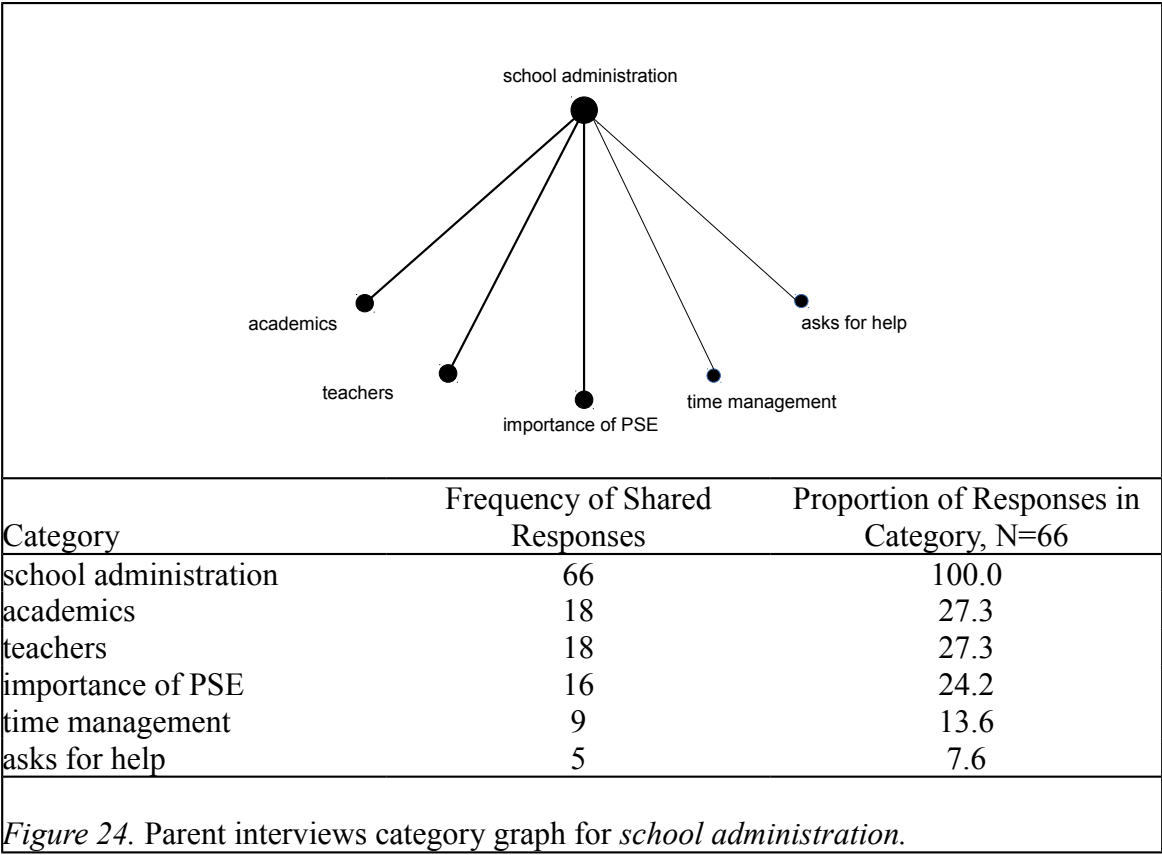
“one female teacher that obviously favoured girls more than the boys in grade 8... [she] just loved most of the girls, but almost all the guys she did not like even the ones that were doing really good in class.” Bob had a teacher who “does not really [tolerate the normal behavior of boys]...we can be ourselves in class and do something, but like a girl could...do something 10 times worse than [what we did]... the teacher would say 'do not do it again'.” Mark simply stated “Male teachers are more tolerant of things that young men do.”

***Male teachers.*** Unlike their parents, the young men were quite vocal about their relationships and preferences for male teachers. Although none expressed a strong preference for male teachers, most of the young men believed male teachers understood them better or were more tolerant of the behaviour of adolescent males. David may have unknowingly described many males' stereotypical perception of the opposite sex: “I find most male teachers are less stuck up about things. Female teachers are more anal about everything....I find the [female] teachers concentrate more on annoying little things...small little things like wearing your hat inside out.”

### **School Administration**

Discussions regarding school administrations was not an area of inquiry built into the interview questions. Rather, it arose organically—as is typical of theory being grounded in qualitative data—as many of the parents described the policies and administration of the schools their sons were attending. See Figure 24 for the school administration category graph.

Five of the seven adolescent male participants attended Roman Catholic schools.



For most of the young men in the Catholic school system, they had attended a Catholic school for all of their schooling. Bob had only recently transferred to his current school for the academic year he had just completed.

The most profound finding with regards to school administration was that, in the opinion of the young men and their parents, the Catholic schools appeared to make a conscious, concerted effort to help the young men achieve academic success. Jaimie described Bob's school as being extremely supportive at that school, extremely motivating and extremely about playing to your strength. The support that Bob has received at the school this year has brought on a lot of discussion...we have actually just realized how unhappy he was at public school....[His perception of his teachers] is completely night and day [when comparing public to Catholic school].

Melanie, whose children have attended both public and Catholic schools, believed that the Catholic school system as a whole does a better job of challenging their students and steers them more towards college or university. She believes they are generally “more encouraging.”

### **Careers**

Discussions with the young men regarding their desire to attend a postsecondary institution also led to a discussion of their career intentions. Most had thought about what they wanted to do “when they grew up.” Cheryl believes JD is sufficiently capable technically for one of the trades, but he may just end up being a construction labourer. As previously stated, Charles thinks he wants to be accountant, or a sports lawyer. George would like to be a chef; Walter would like to be an automotive mechanic; Bob would like

to be a heavy equipment operator.

Jonathan's and David's career aspirations are, first and foremost, to be professional athletes: Jonathan as a hockey player and David as a baseball player. Jonathan understands that the odds of him attaining the lofty position of a National Hockey League player are remote, at best. His second career choice would be to become an electrician, and to his credit, understands that he must maintain a reasonable average in high school in order to qualify to train as an electrician. Having been scouted by American colleges, David, however, believes he is a “shoe-in” for an athletic scholarship, regardless of his high school grades. He believes that, eventually, he will be selected for a major league baseball roster. He says his fallback is to study sports management or sports psychology. However, based on his academic performance up to the end of grade 11, it is not evident that he understands the level of effort and achievement required to undertake such studies.

Overall, it is curious and intriguing, that only Charles expressed an interest in a career requiring a university education. The rest of the young men would need a community college credential at best.

### **Summary**

Fifteen semi-structured interviews were conducted with adolescent males and their parents, gathering their perceptions on a range of factors that might influence academic performance. The parents were asked about their perceptions regarding a number of behaviours suggested in the literature. The young men were asked for their perceptions as to why they engaged in the behaviours identified by their parents.



Approximately fifteen hours of interviews were recorded, resulting in approximately 600 pages of transcripts. The IBM SPSS Text Analytics for Surveys V4 (TAS4) was used to analyze the data. In order to prepare the data for TAS4, the data were decomposed into more than 1,300 individual concepts—singular ideas represented by phrases, sentences or short paragraphs. The QDANG method, developed by the researcher and explained in detail in Appendix I, was used to assist with the inductive qualitative analysis. The first steps in QDANG involve importing qualitative data and applying natural language processing (NLP) to identify keywords within the concepts. The TAS4 NLP engine also created a number of non-mutually-exclusive categories. In addition to the automatic creation of categories, the researcher also created categories beyond those resulting from natural language processing. Following NLP categorization, graphs, or category maps, are constructed as visual aids. Category maps for noncognitive skills, character, academics, and teachers were created. In most cases, separate maps for parents and adolescent male interview data were created.

There were a number of findings, including what is believed by the researcher to be the most important: the young men who participated in this study were not considering future careers for themselves that would require a university education. This is not say that they are consciously ruling out university as an option; they appear to be following their passions which, at the time they were interviewed, did not require a university education. The parents perceived that the young men's time management, attentiveness in class, and willingness to ask for help noncognitive skills were contributing to their sons' academic underperformance. All participants perceived that the young men were able to

work in groups. This facility may be due, in part, to their participation in competitive team sports.

Some of the study's findings were associated with the curriculum or other factors of the school environment. Except for one of young men, the participants identified mathematics as one of their least favourite subjects, the significance of which will be discussed at length in the next chapter. None of the young men expressed having difficulty reading, although they did express a preference for “boy-friendly” titles. The young men had no preference for male or female teachers, although they perceived that male teachers better understood typical adolescent male behaviour (i.e., rough-and-tumble play, wearing hats in class).

The next chapter will discuss these findings in more detail, present suggestions for school reform, as well as propose a conceptual framework for teaching or improving noncognitive skills, executive function, and dimensions of character.

## **CHAPTER FIVE: DISCUSSION**

The previous chapter identified a number of issues, drawn from the results of the study, related to adolescent males and how those issues could affect young men's entry to higher education. The discussion that follows focuses on the areas of inquiry on which the study was built and new areas that emerged during the research. Following that discussion, a framework for strengthening non-cognitive skills, character, and executive function based on project management theory and practice is suggested.

### **Factors Affecting Academic Performance**

Following is a discussion of the study results as they apply to the factors that affect young men's academic performance and how that performance may affect their eventual entry in higher education.

#### **Non-Cognitive Skills**

A range of adolescent males' non-cognitive skills (i.e., their attentiveness in class, ability to organize themselves and manage their time, willingness to ask for help when needed, and ability to work within groups) was a primary focus of the study. One reason for this focus is Jacob's (2002) conclusion that non-cognitive skills, or lack thereof, affect, to the same degree as socioeconomic status, males' likelihood of gaining entry to postsecondary institutions.

Young males' inability to remain attentive and compliant in class has been a common theme in the literature (Lahey, 2013) in terms of constantly running afoul of teachers' traditionally expected classroom model: "orderly classrooms made up of ruler-straight rows of compliant students" (para. 12). Contrary to the expectations presented in

the literature on males' need for rough-and-tumble play (Bjorklund & Brown, 1998; Pellegrini & Smith, 1998), only one of the young men in this study reported having difficulty paying attention in class as a result of not having regularly scheduled in-school physical activity. One mitigating factor may be that all of the young men were very active in organized sports both in school as part of the physical education curriculum and/or more broadly in their community.

Attentiveness in class did however become an issue for several of the participants when the subject being taught and/or participants' perceptions of the ability of the teacher were factored in. For the purposes of this discussion, ability can have several dimensions: basic teaching skills, the adaptation of teaching style to make the subject material “learnable” by all students, or other forms of instructional differentiation. Four of the seven participants cited mathematics as one of their least enjoyable subjects. A disinterest in math should be of particular concern given the poor results of Ontario students in recent standardized math tests (Education Quality Accountability Office, 2013; OECD, 2013). Further discussion of the young men’s difficulties with, and lack of interest in, mathematics and the implications for the young men's higher education prospects is provided in subsequent sections.

Most of the adolescent male participants expressed, to varying degrees, an unwillingness to ask for help with their schoolwork or homework. Most of the parents were perplexed as to why this was the case: for the parents whose son did not ask for assistance, they could not offer any ideas for such behaviour, despite frequently asking their sons why they were not willing to ask for help. However, the young men who were

not willing or would not otherwise request assistance from their teacher(s) were willing to offer an explanation during their interviews. The most common answer was that they expected the teacher to use an explanation undifferentiated from how the subject matter was presented in class.

Mathematics was consistently rated as the young men's most difficult subject. The teaching of mathematics is discussed at length in a subsequent section of this chapter.

In the review of the literature, the ability to work in groups was identified as another non-cognitive skill in which males are generally deficient (Jacob, 2002). However, in this study, the young males appeared to be quite capable of working in groups to complete school and homework. They did find that they performed better in groups when their friends were not part of those groups. Their ability to work well with others may, as stated by one of the participants, be due to their heavy involvement in organized team sports, teaching them how their actions can contribute directly to the outcomes of any group tasks.

The one non-cognitive skill where most of the young men were perceived to be deficient, by themselves and by their parents, was, as Jacob (2002) named it, time management / organizational skills (the two terms are used interchangeably for the purposes of this discussion). For most of the young men, their parents regularly advised them on due dates for school. One parent was even regularly programming the calendar in his son's mobile phone to ensure he met assignment due dates. It must be strongly noted that there were no reports from the parents or their sons that assistance with time management was needed within the context of their sports activities. Overall, most of the

young men believed their organizational skills were adequate, seemingly not perceiving the role of their parents in supporting their organizational needs.

Dr. Jan Frijters asked this researcher to investigate possible links between noncognitive skills and self-regulation (personal communication, 29 October 2014). Galla, et al. (2014) studied the within-person—psychological constructs such as self-regulation and self-efficacy—and between-person (i.e., noncognitive skills) effect of effortful engagement and academic self-efficacy on academic performance. *Effortful engagement* is an index of self-regulated learning developed by Galla, et al. They found that

as students changed (relative to their own mean levels) in their ability to focus on learning activities and to exert effort, as well as in their perceived confidence to do well in school, so too did their performance on reading exams .... As trait-level psychological [constructs] vary within students, [such a] change carries meaningful consequences for academic performance in elementary school-age youth. (Galla, et al., 2014, p. 305)

In measuring the mediational effects of within-person effortful engagement and academic self-efficacy on academic performance,

students who felt more confident in their ability to do well in school and to regulate their own learning were in turn rated by their teachers as exerting more effort during class, which in turn tracked higher scores on standardized reading tests. These findings thus support the claims made by Bandura (1993) and others (Eccles & Wigfield, 2002; Zimmerman et al., 1992) that self-efficacy beliefs are a

key motivational determinant of how much effort a student will put forth in learning activities. (Galla, et al., 2014, p. 306)

In discussing the practical implications of their study, Galla, et al. state that “the results of the current study offer more solid empirical support for arguments in favour of training psychological [constructs] as means to potentially improve academic performance.

### **Character**

Four types of character were examined in the study: intellectual, performance, civic, and moral. Each type describes different facets of a single individual and are indicators of how that individual deals with opportunities and challenges related to the social and natural worlds around them.

Intellectual character (IC) in the young men was qualitatively assessed through their curiosity of the natural world which includes natural settings, as well as outer space. (It is recognized that as a measure of intellectual character, curiosity towards the natural world may not be a sufficient measure.) A recent study by Van Wieren and Kellert (2013) suggested that nature plays a role in the development of children's aesthetic values which include a “sense of beauty, pattern and order, wonder, and discovery” (p. 243). Curiosity, imagination, and creativity are dimensions of an individual's sense of wonder and discovery (p. 251). Van Wieren and Kellert posit that the benefits of an attraction to nature include curiosity, intellectual development, imagination, and creativity (p. 245).

The conclusion drawn from the study is that the young men and their parents did not perceive the young men as curious about the natural world. Nor did they seem drawn

to natural settings or intrinsically motivated to study the natural sciences. Shields states:

teaching and assessment of learning, which tend to emphasize memorization, need to give way to the development of IC if the teaching of higher modes of learning is to be truly successful. Focusing on IC would provide three key advantages: “growth in IC will tend to generalize across domains in ways that specific content learning will not; developing the dispositions of intellectual character will... provide a foundation for a lifetime of intellectual adventure; [and, maybe most importantly] make it clear *why* students should be in school” (Shields, 2011, pp. 49-50).

The young men's civic character was qualitatively examined by querying them about their involvement with community-oriented and community service groups (i.e., Scouts, Cadets, and fundraising or other community support events organized through sports associations). Interestingly, none of the young men, except for Jonathan's brief stint with Beavers, had ever been part of those organizations. In fact, apart from the mandatory community service needed to graduate from high school, none were involved in any community or church groups.

To better understand their moral character, each adolescent male participant was presented with a hypothetical situation where they were a witness to an act of physical bullying. The hypothetical nature of the problem meant each young man could state what his reaction would likely be, without the real, possible consequences of physical injury from the bully. During the course of the interviews, it became clear that most of the young men had either been the victims of physical bullying themselves or had witnessed



such an event firsthand. Mark indicated that he was intentionally doing weight training so that, in the future, he would be capable of fending off physically large individuals. Each of the young men stated he would intervene in one way or another to help a victim of bullying.

The parents were also asked what they thought their sons' reactions would be when witnessing bullying. Here, the parents just did not know, but they hoped their son would not walk away. Given the young men's statements that they would intercede in the face of physical abuse, it would appear they have the kernel of moral grounding expected from members of communities.

Performance character was not directly studied through any specific questioning during the interviews. Therefore, the comments that follow regarding the adolescent males' performance are based on perceptions of the researcher while conducting the interviews. This is the only instance of deviating from the thematic narrative analysis used to analyze the interview data. However, it is believed that this must be done to assess the young men's performance character. None of the young men spoke of any true zeal for their studies. The drive to excel in athletic endeavours seems not to have translated into a similar drive to excel in academic life, according to what the young men and their parents reported, David stated that "I believe my participation in team sports has positively affected how I work in groups on school projects and assignments."

### **Physical Activity and Sports**

Each of the young men in the study is heavily involved in organized sports, at school and/or in their communities, often in a highly competitive setting. David and

Jonathan reported the heaviest involvement in organized sports among the participants, and they also self-reported the lowest academic performance of the young men. There appears to be an inverse proportionality to their involvement: the higher their achievement in sport, the lower their academic performance. This raises several interesting questions that emerged from this research, but which may not have ever been considered were it not for this study.

**Are the young men using athletic achievement as a substitute for academic achievement?** Athletic excellence is certainly an acceptable pursuit for young men. Popular culture is rife with examples of how we as a society value such endeavours. All of the young men who participated in this study were heavily involved in organized sports, most often at highly competitive levels, whether at school or in their communities. And although they were succeeding in their sports activities, none, by their own assessment, were excelling in their studies. Again, this did not become apparent until the interviews were completed and data analysis commenced.

**Are athletics the primary means through which the young men are building a positive self-perception?** Fisher, Juszczak, and Friedman (1996) surveyed 838 male and female students in a New York City high school. The questionnaire “included forced choice questions on demographics, academic performance, sports involvement, leisure time activities, substance use, weight, and sports injuries” (p. 330). Specific questions about sports involvement included: (a) a list of 14 sports; (b) level of sports involvement, and (c) number of hours per weekday and per weekend day spent on sports activities. Participants were also asked about time spent on homework and studying. Further, the

survey included the Rosenberg Self-Esteem Scale, a ten item measure of global self-esteem, and, the Depression Self-Rating Scale (DSRS), an 18 item questionnaire to measure severity of and activity limitations owing to symptoms of depression.

The conclusions reached by the researchers were striking. The data indicated that most of the participants “had athletic involvement, many had unrealistic expectations for their futures, and some utilized unhealthy behaviors in an attempt to enhance performance. Among these students, no association was found between sports involvement and academic performance, self-esteem, or depression” (Fisher et al., 1996, p. 329). Most of the respondents said “they participated for the enjoyment, as a way to spend time, and for the competition” (p. 333).

Although Fisher et al. (1996) conducted their study in the United States, their results cannot be discounted given the nature of competitive play for the current study's participants. Future research is warranted to determine if conditions in Canada, which puts much less emphasis on high school sports compared with the U.S., are similar.

**Is the young men's involvement in sports in some way a factor that contributes to their poor academic standing?** In one participant's case, his mother reported that his sports commitments are interfering with his academic performance and organizational skills. His poor time management often results in assignments being completed at the last moment and in a hurried fashion. For two participants, their time commitments leave little opportunity for curiosity about the natural world or their communities. Nonetheless, one participant reports that his involvement in sports appears to have helped him become more capable of working in groups and given him an

understanding of excellence, at least within the athletic domain.

### **Teachers**

Research for the National Literacy Trust (2012) in the UK has shown that, although the gender of male teachers per se does not influence the academic performance of students, it has shown that male teachers are a role model for showing that reading is not only for girls. Although this study's participants expressed that they had no preferences regarding the sex of their teacher(s), the young men did believe that male teachers understood their motivations and behaviors better than female teachers. Martin and Stan also believed that male teachers in the early years would remind boys and young men that there are good careers beyond sports, and further that academic excellence is also something to strive for.

### **Academics, Careers, and School Reform**

The following section discusses perceptions of participants with respect to specific subjects in school, followed by an elaboration of their thoughts on possible careers for themselves. The section closes with a discussion of possible school and teacher education reforms that may pique the curiosity of young males and enhance their attitudes toward their studies.

### **Academics**

The academic strengths and weaknesses and likes and dislikes of the young men were studied in two ways. First, they were asked if they liked to read, and, if they did not, did they have difficulty reading. None of the young men reported being avid readers—individuals who actually enjoy reading. They reported only reading what was required for

school; however, none expressed any difficulties reading. Their enjoyment of reading was entirely based on what was being read. Stories and other works that were perceived as “being for girls” were read grudgingly. When there was a choice or when the male students could direct the assignment to something that might be considered gender-neutral, let alone male-friendly, they reported being much more content.

The second strategy in assessing their academic bent was to ask the young men to identify their most and least enjoyable subjects. There was no common consensus, beyond physical education, as to a favourite subject. However, there was no question as to their least favourite subject. Mathematics was identified by four (57.1%) of the young men as one of their least favourite subjects. Two others were ambivalent about it; only one actually enjoyed math and expressed any facility with it. As described below, this finding aligns very closely with the release of two sets of standardized tests measuring the numeracy skills of ninth grade students (i.e., approximately 15 years old).

Over the past five years, “the percentages of female and male students who performed at or above the provincial standard [in mathematics] have increased by nine percentage points (to 84%) and by five percentage points (to 85%), respectively” (EQAO, 2013a, p. 14). Further, “students continued to perform best on the questions mapped to the cognitive skill Knowledge and Understanding [i.e., math facts] and had the least success on questions mapped to the cognitive skill Thinking [i.e., problem solving]” (p. 35).

The EQAO 2012-2013 results also showed that “of the students that did not meet the provincial standard for mathematics in Grades 3 and Grade 6, 49% did not meet it in

Grade 9 in the academic mathematics course and 70% did not in the applied mathematics course” (EQAO, 2013b, p. 2). Once students fall behind in the early years of school, they rarely catch up.

To understand how Canada stands in terms of education-derived skills, one need only review the recently released results of the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA) measuring the math skills of 510,000 students from 65 countries. Comparing the mathematics scores between 2009 and 2012, Canada's score has declined—about 1%, which is statistically significant. Canada has also fallen from tenth to thirteenth place in the international math proficiency rankings (OECD, 2010, 2013). There is justified concern for the decrease in mathematics proficiency. Math is a fundamental skill set in business, the natural sciences, technology, and engineering. The inability to master math problem-solving precludes careers in the domains which form the nexus of a knowledge-based economy. Information technology and engineering make up a disproportionate share globally of career opportunities (Ryan, 2014).

In much the same manner as with the results for physical activity, the study results raised more interesting questions, but which may not have ever been considered were it not for this research.

**Are Canadian adolescent males willing to put in the additional effort to overcome their difficulties with mathematics?** Students who did well in the 2012-2013 PISA tests “consistently say that achievement is mainly a product of hard work” (Schleicher, 2013b). They must believe that they are ultimately capable of making such

improvements (self-efficacy). They must learn that failure goes hand-in-hand with success (resilience). They must learn and believe that they have a high degree of control over their destiny (locus of control).

**Do young men believe they are ultimately capable of improved academic performance?** The young men's self-efficacy, resilience, and locus of control as displayed in their athletic lives do not appear to have developed to the same degree in their academic lives. Further investigation of young men's self-efficacy with regards to their academic performance is warranted.

### **Careers**

OECD data show that having a higher level of education helped people to keep or change their jobs [more readily] during the 2008-2009 recession (Schleicher, 2013b). It is curious and intriguing, and of major importance to this study, that only Charles expressed an interest in a career requiring a university education. The rest of the young men reported that they were only likely to pursue a career that would require community college credential. They did not specifically rule out higher education. Rather, it is that they only had career aspirations that did not demand university degree. This lack of interest in careers requiring university, as opposed to community college, only became evident during data analysis. In so far as the young men's disinterest in pursuing careers requiring university studies might be representative of the larger population, this reduced interest may explain, at least in part, the reduced university application rates among males seen by Card, Payne, and Sechel (2011). A detailed study examining adolescent males' consideration of careers requiring university as a postsecondary option would

appear to be warranted. If a lack of interest in such career options is found generally in the adolescent male population, the question also arises in connection with earlier discussions as to whether low performance in mathematics is precluding young men from considering careers in science, technology, engineering, and/or math (STEM)?

### **School Reform**

Having established that there are a number of contributors to young men's academic underachievement, some might ask “What can be done to fix this?” In addition to recommendations from EQAO and OECD, a number of proposals appeared in the public press following the release of the EQAO and OECD PISA results (Alphonso, 2013, 2014; Alphonso & Morrow, 2013; Keller, 2014; Mighton, 2013; Peritz, 2013; Rushowy & Brown, 2013). Other possibilities have been offered that may reverse the trend of the academic underachievement of boys and young men. These fall under two categories: changes in the classroom and structural changes.

**Changes in the Classroom.** The results from this study indicate a number of issues that relate directly to the classroom. To improve young males' academic performance, pedagogical, curricular, or teaching methodology changes must be considered and investigated. Such changes can span the gamut of possibilities from individual teachers adapting their methods to better suit boys and young men to rethinking officially sanctioned curricula that have proved not to connect so well with young males. A discussion of a number of such possibilities follows.

***Let boys be boys.*** Schools have become “hostile to boys' inclinations and interests, abolishing competition in favour of co-operation, and banning rough-and-



tumble play. In high school, they bore boys to death instead of teaching them how to make and build stuff” (Wente, 2013).

Many educators do not enjoy teaching boys “during the hormone-soaked, energetic, and distracted middle- and high-school years....[They] lament that boys are too fidgety, too hyperactive, too disruptive, derailing the educational process for everyone while sabotaging their own intellectual development” (Lahey, 2013, para. 5).

Cornwell, Mustard, and Van Parys (2013) studied the effects of non-cognitive skills (e.g., attentiveness in class) and gender disparities in relation to standardized test scores and teacher assessment in the primary grades. They analyzed Early Childhood Longitudinal Program (ECLS) data from the U.S. National Center for Education Statistics to understand the “relationship between the (objective) test-score differences and (subjective) teacher grades” (p. 5). Although their study focused on primary students, it is important to remember that primary grades can affect, among other things, class placement in high school (i.e., streaming). Academic performance in the primary grades might also affect their future self-efficacy, but that requires further study.

Cornwell et al. (2013) used the Attitude to Learning (ATL) component of the Social Rating Scale (SRS) to account for teacher assessed non-cognitive skills: “how well each child was engaged in the classroom, how often the child externalized or internalized problems, how often the child lost control, and how well the child developed interpersonal skills” (p. 8). They determined that “boys who perform equally as well as girls on reading, math, and science tests are graded less favourably by their teachers, but this less favourable treatment essentially vanishes when noncognitive skills are taken into

account” (p. 1). A troubling result of the same study was that “there is evidence of a grade 'bonus' for boys with test scores and behavior like their girl counterparts” (p. 1). In other words, well behaved boys score higher than boys who need to be active—or behavior that stereotypically comes naturally for boys and young men—even when their performance levels are similarly matched. If boys and young men cannot comport themselves in a manner that fits their natures, what message is being sent to those same boys and young men?

The International Boys' Schools Coalition commissioned a study (Reichert & Hawley, 2009) to understand the best practices for teaching boys in six countries across diverse socioeconomic strata: the U.S., the U.K., Canada, Australia, New Zealand, and South Africa. The recommendations of that research centres on classroom practices. Lessons should:

result in an end product; be structured as competitive games; require motor activity; require boys to assume responsibility for the learning of others; require boys to address open questions or unsolved problems; require a combination of competition and teamwork; focus on independent, personal discovery and realization; and, introduce drama in the form of novelty or surprise (Lahey, 2013, para. 7).

Lahey believes these approaches are useful for both boys and girls, but especially boys.

***Differentiated instruction.*** Differentiated instruction (DI) is “effective instruction that is responsive to the learning preferences, interests and readiness of the individual learner” (Joly, 2009, p. 1). DI is not individualized instruction. Rather, it is “responding to

varying student needs by providing a balance of modeled, shared, guided and independent instructional strategies” (Ministry of Education, 2009, p. 5). The Ministry of Education offers a number of reasons for using DI. It:

allows educators to grow in their ability to read their students and then to adapt their practice to effectively teach all students; increases student motivation and achievement [by providing] appropriate levels of challenge and support, [thus students] are engaged, motivated and their achievement improves; allows [educators] to forge strong connections between subject [material] and students, which improves student learning; help adolescents become independent learners [by helping them] find out about themselves as learners, [thus becoming] more independent, working as responsible members of a community, and respecting and affirming the diversity of others (Ministry of Education, 2010, p. 5).

Several of the study participants indicated they did not seek assistance with their schoolwork or homework because they expected the teacher would use the same (i.e., undifferentiated) approach as was used in class.

***Teaching math and science.*** The current approach to teaching mathematics and science in Ontario and the rest of English-speaking Canada—unguided instruction or “discovery learning”—has been in place since the late 1990s. Gurian (2010) describes boys and young men as being more suitable for deductive reasoning—constructing reality from theory, rather than inductive—constructing theory from reality—reasoning. (See Figure 13 which shows these cycles.) Discovery learning falls under the rubric of inductive learning.

Jurisdictions that rely more on guided learning show better outcomes for mathematics learning. Quebec was “the only province in the international PISA results where the proportion of students performing poorly did not increase; it was also the top scorer nationally” (Alphonso, 2013, para. 5). It is believed that Quebec had a higher ranking because it places more emphasis on traditional drills than other parts of the country (para. 6). Teachers in Quebec also receive specialized training in math (para. 6).

In partially or minimally guided instruction, students are supposed to discover relevant concepts through interactions with their peers. However, Clark, Kirschner, and Sweller (2012) state that “the past half century of empirical research has provided overwhelming and unambiguous evidence that, for everyone but experts, partial guidance during instruction is significantly less effective and efficient than full guidance” (p. 7). They further declare that “based on our current knowledge of how people learn, there is no reason to expect that partially guided instruction in K–12 classrooms would be as effective as explicit, full guidance”. (Refer to Chapter 2 for a detailed explanation for the unsuitability of unguided or even partially guided instruction.)

It appears that there is no body of sound research that supports using the [instruction with minimal guidance] with anyone other than the most expert students. Evidence from controlled, experimental studies almost uniformly supports full, explicit instructional guidance rather than partial or minimal guidance for novice to intermediate learners. These findings...suggest teachers should provide their students with clear, explicit instruction rather than merely assisting students in attempting to discover knowledge themselves. (p. 11)

There should be a sense of urgency with regard to the revision of the math curriculum. The OECD PISA results show Canada is falling behind its economic competitor nations, which conceivably could be a key contributor over time in the overall decline in the Canadian standard of living if the decline in male enrolments in higher education is not addressed.

**Structural changes.** Suggested structural changes are those that occur outside the confines of the classroom but, hopefully, will affect the outcomes of instruction. Changes to teacher training, school organization, and school environment are discussed below.

***Teacher education.*** The recommendations here focus mainly on improving teachers' proficiency with, and ability to teach, mathematics. This focus is driven by three issues. First, all but one of this study's adolescent male participants expressed an aversion to mathematics. Second, Canadian students' poor performance in the math portions of standardized tests were troubling, indicating a long-term decline in math scores (EQAO, 2013; OECD, 2013). Third, mathematics plays a central role in STEM-based careers and business. Such careers, which require a university education and sometimes an advanced degree, will not be available to students with poor mathematics skills.

“An alarming number of elementary-school teachers are so uncomfortable with math, they can't teach it properly” (Wente, 2013, para. 5). The result is that the students of those same teachers arrive at university without the fundamentals needed to grasp even the basics of advanced mathematics (para. 2). The Ontario education minister—Dr. Liz Sandals—added a paid professional development day to the current school year and called on elementary teachers to use it for math (Brown & Rushowy, 2013). But will this

overcome the math-aversion of significant numbers of teachers?

Francis argues, “Most elementary teachers come from a humanities background, and many are scared to death of math” (as cited in Brown & Rushowy, 2013, para. 10). Wilfrid Laurier University professor David Vaughan “has long called for specialist math teachers in elementary school who have a bachelor's degree in math”. This begs the question: where will these specialists come from? “Not enough math majors go into teaching, especially elementary school, because they all get jobs in [more lucrative] fields....If you want to have math specialists go into teaching, you’d have to make those jobs attractive [but] no one wants to spend money” (Brown & Rushowy, 2013, para. 7). The key will probably lie in addressing teacher candidates' math aversion by augmenting their own basic math skills, not just their math-related teaching abilities.

Professor Mary Reid of the Ontario Institute for Studies in Education (OISE) gave preservice teachers a Grade 6 math test at the start of training and found many struggled to remember basic concepts from prime numbers to calculating the volume of a container. She found that the less they remembered, the more anxious they were (Brown & Rushowy, 2013). Postsecondary technical disciplines are requiring their students to complete courses in communication. Should teacher candidates not be required to pass a basic math exam before graduating, something for which Reid is calling?

***Streaming.*** One participant, Cheryl, spoke of how her foster son’s school pressured her to put JD in the applied stream at his school, primarily because he was a foster child. Cheryl was able to resist that pressure. The Ontario secondary school curriculum prescribes two streams for students entering Grade 9 (Ministry of Education,

2007a, 2007b). The *academic* stream is for students intending to continue their studies in university following graduation from high school. The *applied* stream is for students who intend to enter the workforce or trade school following the completion of high school. Gurian's (2010) work has shown that adolescent males' IQ increases in adolescence, thus any decisions based on a young male's cognitive abilities at the end of Grade 8 may be "limiting or cutting off postsecondary options and even influencing whether they graduate" from high school (Rushowy, 2014a). The OECD believes that early tracking "exacerbates inequities since students from disadvantaged backgrounds are more likely to be placed in the least academically oriented tracks or groups" (OECD, 2012, p. 56).

The OECD recommends that early tracking decisions be deferred "until upper secondary education through comprehensive schooling" (OECD, 2012, p. 56). One Kingston, Ontario school has done just that, eliminating streams in grade 9. To compensate for any skills gaps, students are offered an additional learning strategies course (Rushowy, 2014b).

***Single-sex environments.*** The Toronto District School Board commissioned an extensive review of the literature around the topic of single-sex schools and classrooms, authored by Erling and O'Reilly (2009). Single-sex classrooms are coeducational schools which offer single-sex classes for some subjects but which retain at least some co-educational activities. In single-sex schools, students attending any of those schools have all their school activities in a setting which is all-boys or all-girls.

Taylor and Lorimer state that "drawing attention to the needs of boys does not require massive expenditures or programs, but a willingness to look at the philosophical

underpinnings” of single-sex classrooms or schools (as cited in Erling & O'Reilly, 2009, p. 8). Taylor and Lorimer propose research-based strategies to motivate young men to improve their academic achievement:

Offer more technology and increased use of computer education to engage boys; use multiple literacy strategies such as ... use of non-fiction, texts that appeal to boys' interests, give them more choice and options in terms of literacy assignments; establish and encourage male mentoring relationships, e.g. class guests, influence of older high school or college-age mentors; incorporate more action-oriented tasks and opportunities for physical activity (as cited in Erling & O'Reilly, 2009, p. 8).

**Alternative systems.** The thoughts and suggestions under this rubric relate to substantial, if not radical, structural changes to large parts of the K-12 educational system.

***A new kind of high school.*** The *Equinox Summit: Learning 2030* proposed a radically different structure for high schools, “eliminating grades 9 through 12 in favour of groupings of students based on ability and area of study. Students would progress through high school, not by their ages, but by the stages they're at.” (WGSI, 2013). The summit participants offered “a vision of a scalable, affordable, sustainable learning system for the high school graduates of 2030” (Brooks & Holmes, 2013). At the centre of their vision, the summit described the attributes of high school graduates that would enable them to reach their full potential in life:

lifelong learners; literate, numerate, and articulate; creative, critical thinkers; able



to collaborate effectively with others; open to failure as an essential part of progress; adaptable and resilient in the face of adversity; aware of the society they live in; self-aware and cognizant of their own strengths and limitations. (p. 3)

Some of these attributes are the very same ones that the young men who participated in this study need to strengthen according to their parents. Others were acquired outside of school, in pursuits such as organized sports. But what of those boys and young men who are not able to develop non-cognitive skills, character traits such as resilience, self-efficacy and multiple intelligences in school? Many young men from lower socioeconomic backgrounds simply cannot afford the cost of participating in competitive sports, as the participants in this study did.

***Distance-mode secondary education.*** Tierney (n.d., 2013a, 2013b) has proposed distance education (DE) as an alternative model for educating boys and young men, particularly for secondary education. A well designed and implemented DE system is suited to support the educational framework for developing noncognitive skills, dimensions of character, and executive function proposed in the following section. DE offers an entirely different mode of education to the traditional bricks-and-mortar school. It is commonly found in postsecondary institutions, but distance learning has not made large inroads into K-12 systems. There is, however, an example which merits further study: the Florida Virtual School (FVS). FVS was founded in 1997 and was the United States' first, state-wide Internet-based public high school. In 2010-2011, it had over 125,000 students and served all 67 school districts in the state (see Tierney [2013a] for a full discussion of this institution).

A number of studies have shown that DE is one instructional model where males and females are on an equal footing in both cognitive and non-cognitive domains (Atkinson, 2004; Price, 2006; Shotick & Stephens, 2006; Topçu, 2006). In purely distance mode settings where “classmates” are unlikely to have ever met, male and female measures of self-efficacy are comparable (Shotick & Stephens, 2006). Further, the anonymity of asynchronous communication, a major component of online education, allows males to be more expressive than they might otherwise be in traditional face-to-face classrooms (Topçu, 2006). Distance education may provide an opportunity for addressing the needs of adolescent males.

The present author's model for teaching attitude for life style change (TALC; Tierney, n.d., 2013b) and TALC-D (Tierney, 2014), its distance education based variant for population scale change, offer a framework based on the transtheoretical model and social marketing, which leverage distance education as a way of addressing a number of issues reported by the adolescent male participants and parents in this study. Attitudinal change with regards to performance or engagement with the young men's community may be “instillable” using TALC/TALC-D. Distance education environments can be built to assist with time management, as well as to provide metacognitive tools.

**Accommodating more young men at college and university.** A guiding tenet of this research is that any recommendations for accommodating more young men in postsecondary education must not be seen as potentially eroding the substantial gains made by females, minorities, and other cultural groups over the last several decades. To accomplish this, using a “blue ocean strategy” may be the best approach. Kim and

Mauborgne (2005) contrasted commercial competition and innovation as red oceans and blue oceans. Red oceans were where “products became commodities, and cutthroat competition turns the red ocean bloody” (p. 4). In blue oceans, markets are untapped; there is no competition “because the rules of the game are waiting to be set” (p. 5)

When the numbers of males in postsecondary education increase, there must actually be new places for them at institutions of higher learning. However, the 2008 economic downturn and the ensuing precarious state of the global economy have made...fiscal environment[s] challenging. Substantial new investment by the government at levels comparable to the previous decade is not feasible. Also, as enrolment growth is expected to slow in the near future so too will operating grant funding. With institutions’ costs outpacing growth in revenues from operating grants and tuition, existing cost structures are under pressure. (Ministry of Training, Colleges and Universities, 2013)

One approach to addressing such constraints is the Centre of Excellence for Online Learning, dubbed Ontario Online, announced in January 2014 with an objective to give students across the province one window of access to high-quality online courses” that are transferable amongst partner institutions (Ministry of Training, Colleges and Universities, 2014). Ontario Online “will be run by colleges and universities as an independent not-for-profit enterprise, and aims to increase options for students to learn online and allow schools to share resources and expertise in online teaching” (Bradshaw, 2014).

***MOOCS and digital badges.*** Massive open online courses (MOOC)—“free online

courses offered by universities which anyone in the world with high-speed internet can participate in” (Gose, 2012, p. B8)—are a form of distance learning that began to appear in the early-2000s. One of the first was the OpenCourseWare (OCW; [ocw.mit.edu](http://ocw.mit.edu)) by the Massachusetts Institute of Technology (MIT) wherein their entire undergraduate curriculum was made available at no charge to learners on the OCW software platform (Reif & MIT, 2013). As of late 2013, over 150 million learners worldwide have accessed the OCW system, many of whom have “little or no access to higher learning” (p. 54). In 2012, MIT partnered with Harvard University to establish EdX ([www.edx.org](http://www.edx.org)), another Internet-based education platform.

Early MOOCs such as MIT's “often offered little more than reading lists and lecture notes. [Newer entrants] are far more interactive, interspersing quizzes and other assignments among short videos” (Gose, 2012, p. B8). One important feature of the newer MOOCs is the ability to offer certificates for course completion, which are usually predicated on some form of formative evaluation. EdX offers three forms of certificates of achievement (EdX Verified Certificates of Achievement, n.d.). *Honor Code* certificates certify that the learner successfully completed a course, but does not verify the learner's identity. *Verified* certificates shows that the learner has successfully completed an edX course and verifies their identity through photo ID. *XSeries* certificates are given when a student completes and passes a series of courses in a specific subject. The Verified certificate would be formal recognition of work completed which could be used for employment, promotion, or further study. The XSeries or similar certification would demonstrate verified proficiency in a broader field of study.

In addition to certificates of achievement, digital badges—certifying skills and abilities—are modeled on scouting badges (Bell, 2012). They denote areas employers might look for (Young, 2012, 48). When combined with MOOCs, they offer a means to define a custom suite of qualifications. Provided verified certificates and/or badges can overcome inherent security issues, they may represent a true alternative to a degree in engineering, computer science, or finance.

### **Conceptual Framework for Strengthening Non-cognitive Skills, Character, and Executive Function**

This section presents a conceptual framework for developing non-cognitive skills, character, and executive function based on project management theory and practice. The discussion that follows is conceptual in nature, meaning it must still be empirically tested. It is hoped that the ensuing presentation will spur such future research. The framework itself links project management to teaching noncognitive skills, dimensions of character, and executive function. The idea for such a link came from the researcher's decades-long experience as a project manager and as an instructor of project management theory and practice. As described previously, time management is one of the cornerstones of project management, along with scope and cost (resource) management. Furthermore, many of the executive functions have a direct correlation to aspects of project management theory. Most of the young men and their parents perceived the young men to have weak time management skills. If project management can be taught, can it be used to teach appropriate skills? The following discussion will attempt to answer that question.

The results of this study identified the need for more attention to non-cognitive

skills (i.e., time management, attentiveness in class, and willingness to ask for help) and aspects of character (i.e., intellectual, performance, and civic) in the adolescent male participants. The following discussion draws from the literature on non-cognitive skills, character, psychological constructs, executive function, and project management, an introduction to which can be found in Chapter 2. Those concepts are deconstructed to build the beginnings of a framework that uses project management theory and practice to mediate the development of non-cognitive skills and dimensions of character by supporting the development of life skills and executive function.

### **Life Skills**

The United Nations Children's Fund describes life skills as “abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life” (as cited in Byrne, 2010, p. 3). Byrne (2010) posited a relationship between those skills and the skills required for project managers (p. 3). The list of life skills Byrne used in his analysis was developed by combining life skills recommended by The World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the United Nations Educational, Scientific, Cultural Organization (UNESCO), and the Partnership for 21<sup>st</sup> Century Skills ([www.p21.org/](http://www.p21.org/)). Those skills, plus descriptions and/or comments on each follow.

**Communication skills.** Communication skills “form the backbone for the success of any project. [They can] take the form of written and oral communication, providing and receiving feedback, understanding and adapting to different cultures, and diversity in the workplace—all of which are considered...as critical in today's work environment”

(Byrne, 2010, p. 4).

**Negotiating, influencing, and persuasion skills.** “[Students] need to be good negotiators to be successful in school or the workplace. The ability to influence and persuade—to motivate and manage others—is an [important] skill to have” (Byrne, 2010, p. 4).

**Empathy.** Empathy is “the ability to listen and understand another's needs and circumstances and to express that understanding” (Byrne, 2010, p. 4). Byrne describes a project manager’s role as striving to take another’s needs and circumstances and turn them into concrete actions, and, asks the question “shouldn’t our children learn this as well?”

**Teamwork, cooperation, and collaboration.** Byrne (2010) believes that “these skills make a project manager, student, or a new employee a success or a failure faster than any other single set of skills. Learning how to work with others and be productive while doing so are critical skills for everyone” (p. 4).

**Critical thinking and problem solving.** In a project management context, Byrne (2010) likens critical thinking and problem solving to integration management which requires multidisciplinary capabilities to actually solve problems and gain a consensus amongst affected stakeholders.

**Ethical behaviour.** The Project Management Institute’s (PMI) Code of Ethics and Professional Conduct (Project Management Institute, n.d.) sets out four values as its foundation: responsibility, respect, fairness, and honesty. These values are also found at the heart of character, as described in Chapter 2.

**Self-assessment and self-management.** Self-assessments are “invaluable in discovering issues regarding our [work] or ourselves. As a life skill, self-assessment is invaluable in discovering our work habits” (Byrne, 2010, p. 5).

**Time management and positive thinking.** As a life skill, time management, includes such activities as getting work done on time, scheduling events, and being punctual. In the (in)famous words of Woody Allen, “80 percent of life is [just] showing up” (Wikiquote, 2014).

The results of Byrne's (2010) analysis, with additional suggestions by the researcher, are summarized in Table 11.

### **Framework Development**

A proposed pattern, which can be considered the abstract architecture of a proposed strategy for developing executive function is shown in Figure 25. That pattern shows generalized links between: non-cognitive skills and character with life skills; life skills with project management; project management with executive function; and, executive function with psychological constructs. The theory map in Figure 26, based on the initial pattern, is a more developed deconstruction of non-cognitive skills, character, life skills, project management, executive function, and psychological constructs. It was used to investigate several scenarios, based on the study's results, which could eventually be transformed into formal curriculum changes for application in the classroom.

Performing a commonality and variability analysis of the components of non-cognitive skills, psychological constructs, and character suggested a number of connections/relationships, either directly or tangentially, amongst them. The only

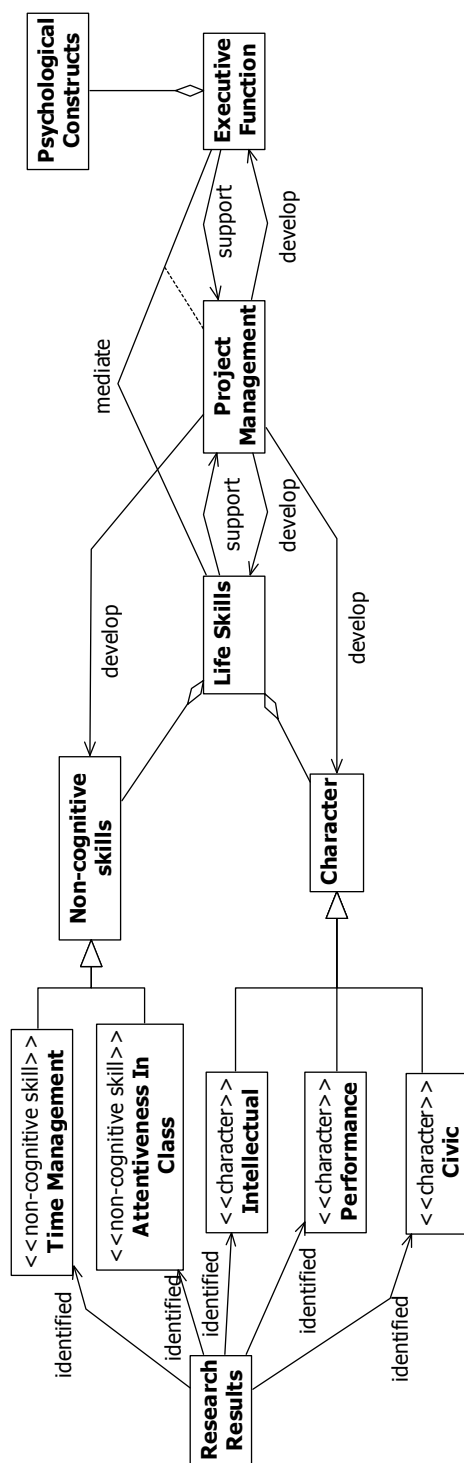


Table 11

*Relationships Between Life Skills and Project Management Theory and Practice*

Life Skill	Byrne (2010)	Additional*
Communication skills	Communications Mgt.	
Negotiating, influencing, persuasion skills	Procurement Mgt.	Communications Mgt.
Empathy (the ability to understand from another perspective)	N/A	Scope Mgt. Communications Mgt. Human Resources Mgt.
Cooperation, teamwork, collaboration	Human Resources Mgt.	Communications Mgt.
Critical thinking and problem solving	Integration Mgt.	Risk Mgt.
Ethics	Ethics	
Self-assessment	Quality Mgt.	
Time management and positive thinking	Time Mgt.	Scope Mgt.

\* As suggested by Tierney



*Figure 25* Pattern for discovering strategies for developing non-cognitive skills, character, and executive function through project management practice.

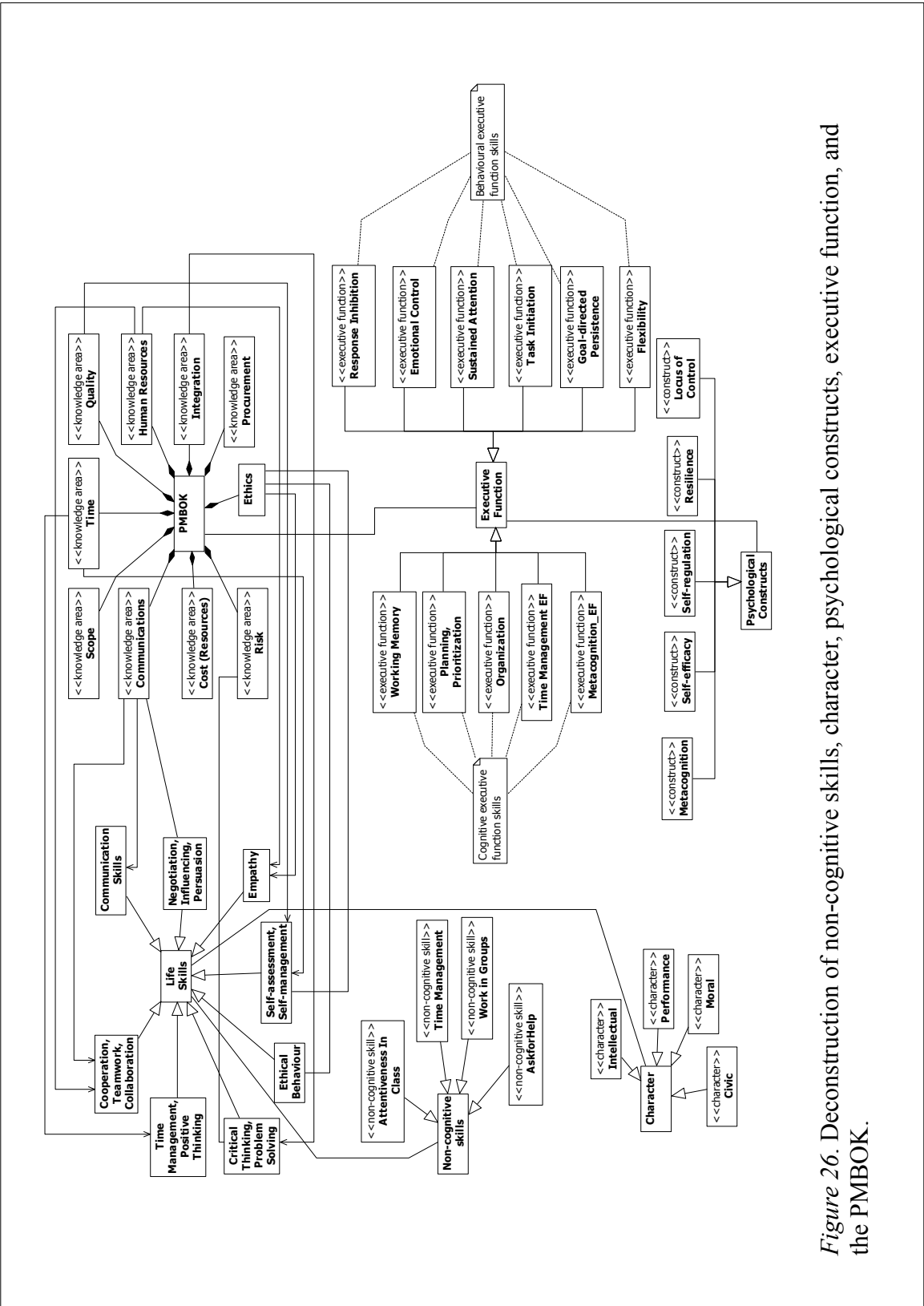


Figure 26. Deconstruction of non-cognitive skills, character, psychological constructs, executive function, and the PMBOK.

executive function that does not immediately appear to have an association with non-cognitive skills, the psychological constructs, or character is working memory.

Nonetheless, it can be tied directly to previous discussions on cognition.

A number of non-cognitive skill/executive function (EF) pairings are suggested: attentiveness in class with the EF sustained attention; time management with time management. The psychological construct/EF pairings could be metacognition with metacognition; resilience/flexibility; self-regulation/response inhibition; time management/organization. The character/EF pairings could be performance/organization; performance/task initiation. Table 12 lists a number of other possible linkages.

Before proceeding any further with an examination of whether noncognitive skills are malleable; can they be taught or reshaped? Farrington, et al. (2012) concluded from their study, a meta-analytic literature review on noncognitive skills and academic performance, they are malleable and can be taught or changed. Such a conclusion is of major importance to this study, providing a valid foundation for the recommendations on such changes that follow.

An important aspect of the linkage between project management and executive function is that the PMBOK contains not only theory, but practical application of the knowledge areas to everyday situations. Various processes, tools, and techniques are described in the PMBOK that can be used to instantiate artifacts to facilitate the processes. The researcher believes that these artifacts could be used to assist in developing life skills/executive function in students. However, that will require further research. The balance of this discussion is intended to form an initial framework on

Table 12

*Relationships between Executive Function and Non-cognitive Skills, Psychological Constructs, and Dimensions of Character*

Executive Function	Non-cognitive Skill	Psychological Construct	Character
Planning/ prioritization	time management	self-efficacy	Performance
Organization	time management	self-efficacy	Performance
Time management	time management	self-efficacy	Performance
Metacognition		metacognition locus of control	Performance
Response inhibition		self-regulation	Moral
Emotional control		self-regulation	Moral
Sustained attention	attentiveness in class	resilience	Performance
Task initiation	time management	self-efficacy	Intellectual
Goal-directed persistence	attentiveness in class	resilience locus of control self-efficacy	performance
Flexibility		resilience self-efficacy	

which the suitability of project management theory can be investigated in order to inform the teaching and development of life skills.

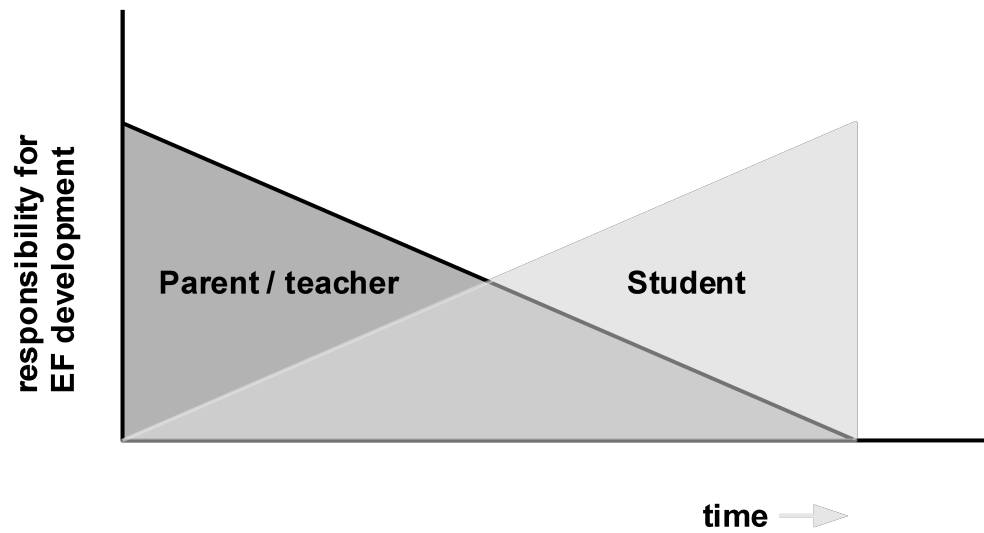
### **Natural Development of Executive Function**

The normal development of executive function begins at birth and continues through adolescence (Guare, Dawson, & Guare, 2013). Strengthening weak noncognitive skills, character, and executive skills requires gradual, sustained effort on the part of both parent(s)/teacher(s) and the individual student. Parents and teachers will initially lead the development process, with the expectation that the student will increasingly become responsible for his transition. Figure 27 illustrates these changing responsibilities over time.

### **Application of the Framework to Study Results**

In order to test this framework, two separate strategy development scenarios are proposed. The first scenario starts with the study result where evidence of the young men's ability to work in groups was perceived to be strong. The study also found that the time management non-cognitive skill would benefit from being further developed in most of the adolescent participants. The second scenario looks at developing a strategy for strengthening that skill. For both scenarios, the process will be simple and straightforward, using "auto-brainstorming". Brainstorming is "a technique by which... ideas [are] generated to find a solution for a specific problem by amassing ideas spontaneously and without judgment" (Schwalbe, 2007, p. 459).

The approach here is to follow the strategy architecture pattern (Figure 25), using the theory map (Figure 25) to populate the strategy with specific life skills, artifacts from

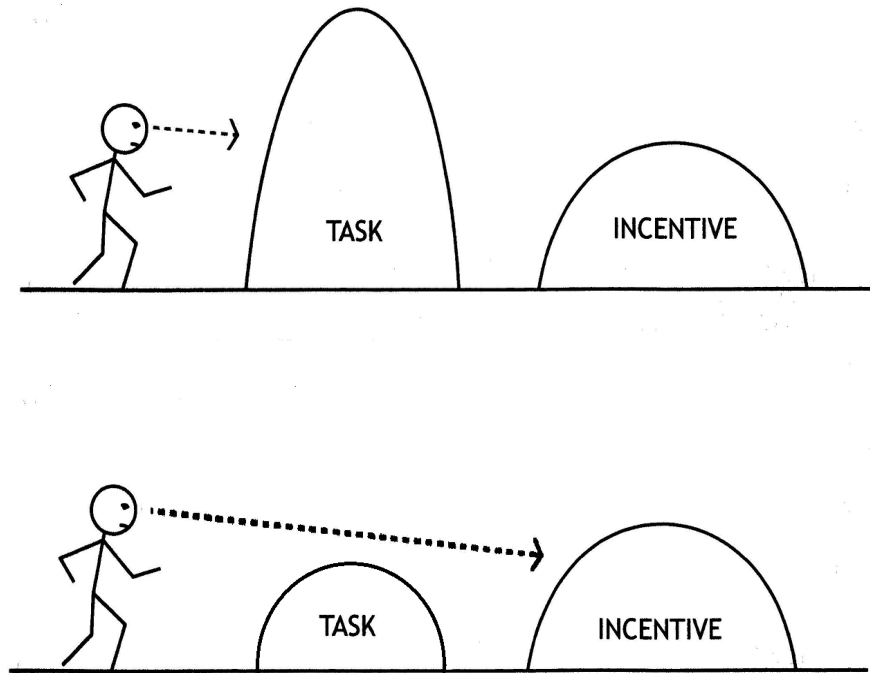


*Figure 27.* Transition of responsibility for executive function development over time.

the PMBOK, and relevant executive functions and psychological constructs. It must be unequivocally stated that this strategy population process is qualitative in nature, is using personal experience to suggest relationships amongst various strategy components, and, most importantly, has not as yet been empirically tested.

**Motivation.** After many years in project management, I came to understand that a primary function of a project manager is to motivate team members to happily work themselves out of a job; when the project is complete, their job is gone. Guare et al. (2010) explain that motivating adolescents requires an incentive whose intrinsic value to the adolescent is not occluded by the perceived difficulty of the task (see Figure 28). Motivation falls within the Human Resources Management knowledge area of the PMBOK; I prefer to call it Human Relations Management. Herzberg's (1987) motivation-hygiene theory is an appropriate motivational approach. In the workplace, a hygiene factor—an aspect of employment that could cause dissatisfaction, but intrinsically is not a motivator, includes pay, work environment, or a computer or other required equipment—are related to job dissatisfaction, but not motivation (Schwalbe, 2007). Although it may seem counter-intuitive that something such as pay is not a motivator, but a hygiene factor, think of the last time you got a raise. How long afterwards were you thinking you deserved another raise? At that point, pay has become a hygiene factor. Herzberg (1987) did find that “motivators included achievement, recognition, interesting work, and responsibility” (p. 365). In the context of adolescents in the twenty-first century, a hygiene factor might be access to a mobile phone or a smartphone. A motivator might be allowing them to drive the family car.





*Figure 28.* The difficulty of a task must not occlude the value of the incentive.  
(Adapted from *Smart But Scattered Teens*, by R. Guare, P. Dawson, and C. Guare.  
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**Scenario 1: Working in groups (non-cognitive skill).** The purpose of this scenario is to determine if it is possible to find a path through the theory map) based on the discovery pattern shown in Figure 25. The establishment of a path that connects the non-cognitive skill, in this case, the ability to work in groups, with project management, suggests that there may be merit in the approach. Extending the path to executive function would be even more useful, allowing for the development of strategies to augment executive function.

As previously stated, this process will be a qualitative one, using visual inspection and/or personal experience to make the various connections, thus constructing the elements of a strategy. The narration that follows starts with Figure 29. Starting at the *Works in Groups* non-cognitive skill:

- Two-way connections are made with *performance character* and *civic character*.  
In this case the two-way connections are used because it is believed that a symbiotic relationship of sorts exists. Performance character comes into play in terms of the need to produce high quality work in order to maintain functioning relationships with other members of the group. Civic character would be associated with the need to respect proper functioning of the group and a genuine concern for the needs of individual group members.
- A number of links can be made between Work in Groups and specific life skills:
- Good *time management skills* are needed to meet deadlines and completion dates.
- *Cooperation, teamwork, and collaboration skills* and *communication skills* are needed for the smooth functioning of the group.

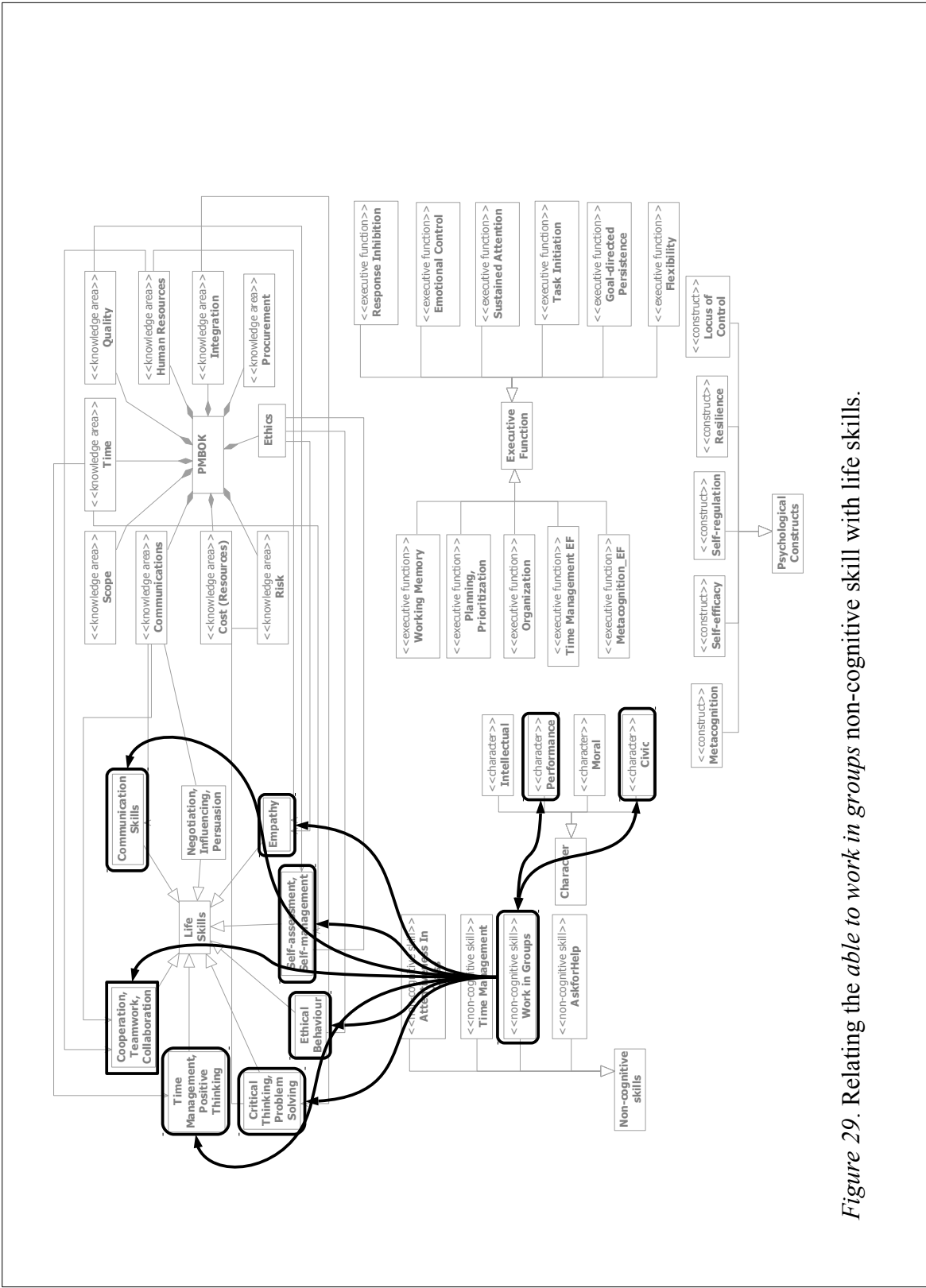


Figure 29. Relating the able to work in groups non-cognitive skill with life skills.

- *Empathy* for other team members is needed to promote good team dynamics.
- An understanding that each group member must not unduly burden other group members would be a form of *ethical behaviour*.
- *Self-assessment/self-management* is needed to ensure deliverables and deadlines will meet expected quality.

Developing the relationships between life skills and project management is straightforward, using the relationships described in Table 12. The relationships between life skills and the PMBOK for Scenario 1, as illustrated in Figure 30, are believed to be:

- *Self-management, and ethical behaviour* relate to Ethics. Empathy relates to Ethics and Human Resources Management.
- *Self-management/self-assessment* relate to Time Management
- *Communications skills* relates to Communications Management.
- *Empathy* relates to Human Resources Management.
- Time management relates to Time Management.
- Cooperation, teamwork, collaboration relates to Communication, Human Resources, Time, and Quality Management.

The relationships between project management and executive functions were developed by looking at which executive functions may be required to support a given PMBOK knowledge area. The results of that examination, as illustrated in Figure 31, follow (PMBOK knowledge areas are capitalized; executive functions are italicized).

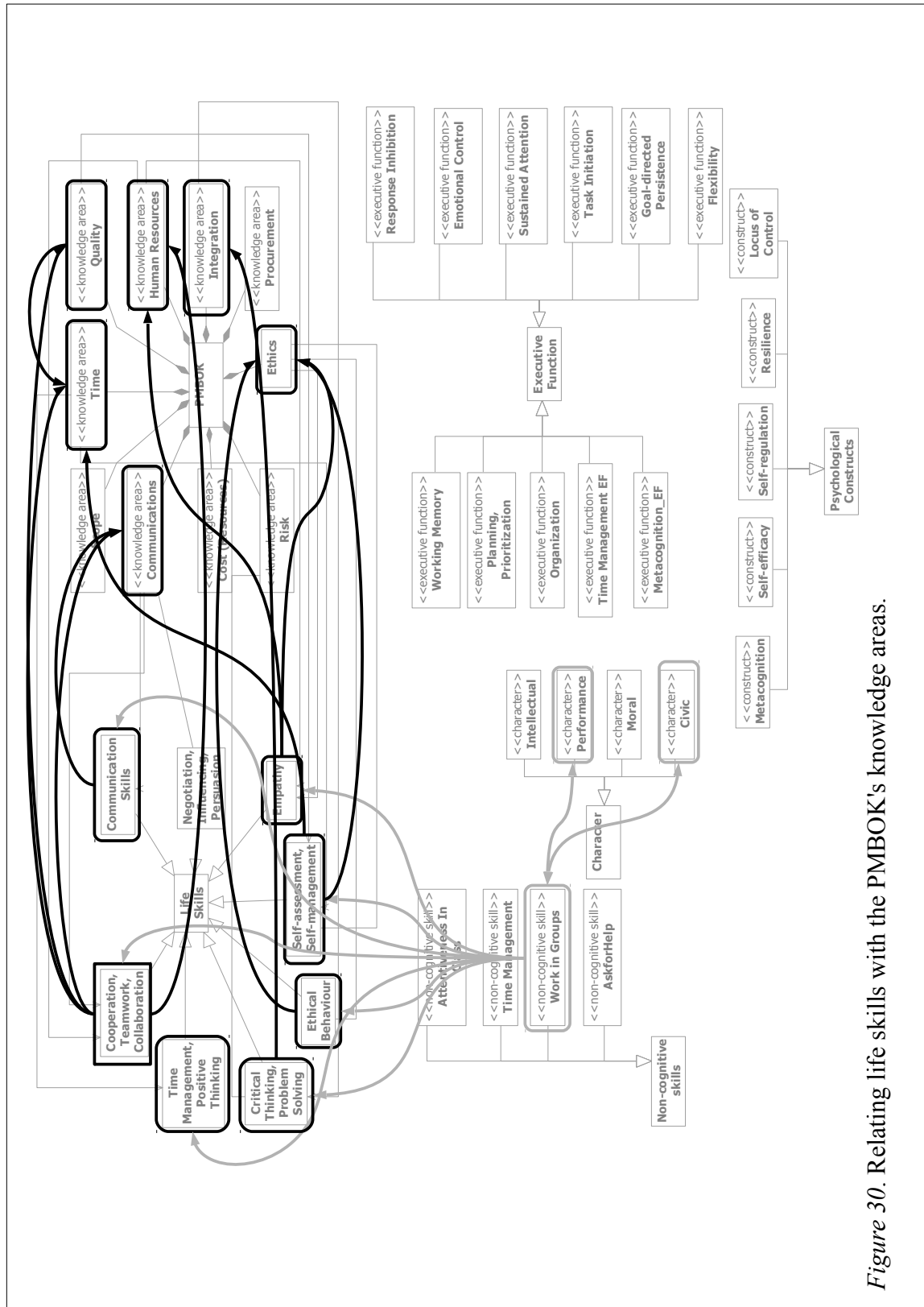


Figure 30. Relating life skills with the PMBOK's knowledge areas.

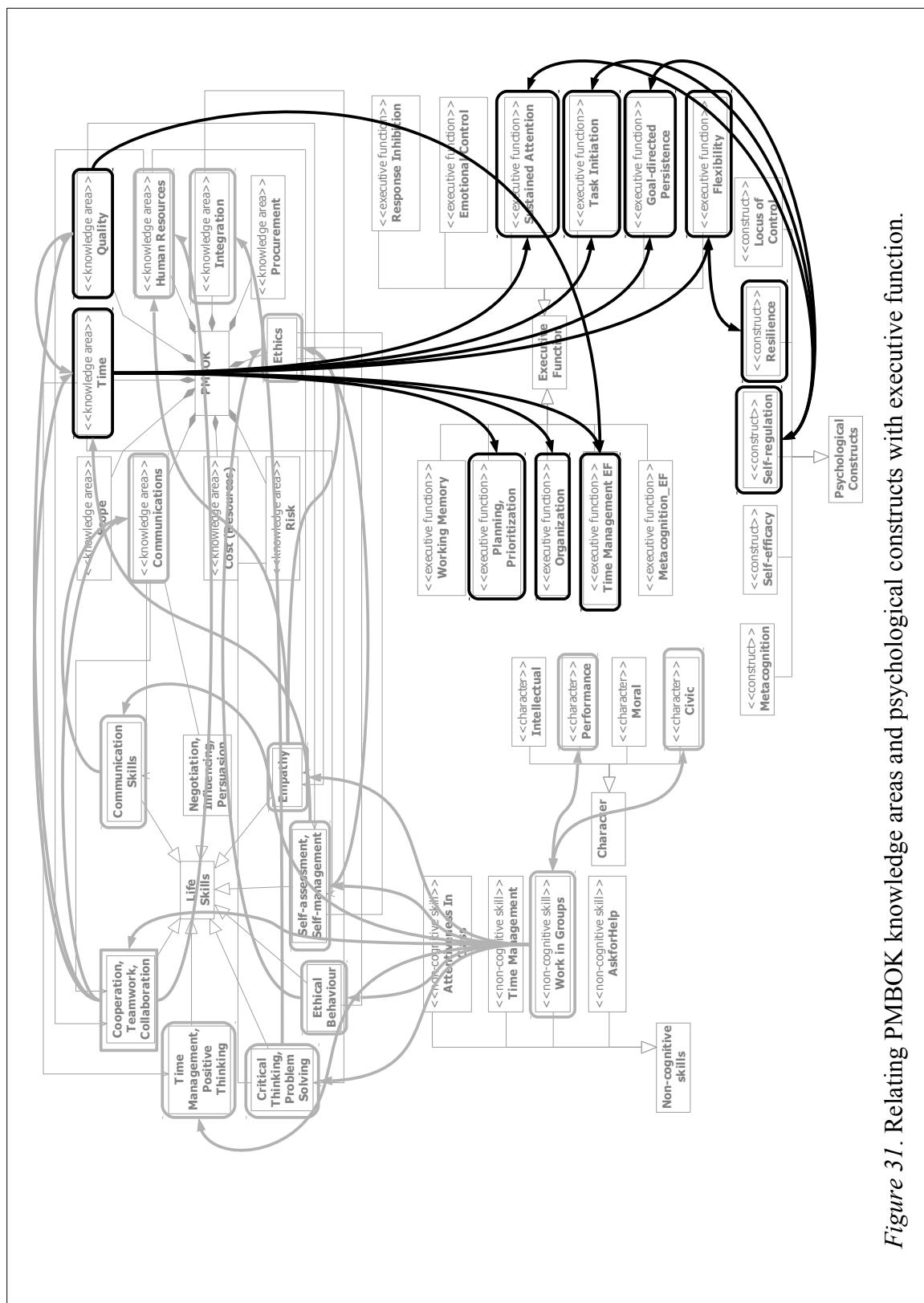


Figure 31. Relating PMBOK knowledge areas and psychological constructs with executive function.

being part of the quadruple constraint, and Time Management requiring previously stated executive functions.

The PMBOK's Communications Management, Human Resources Management, and Ethics do not appear to have direct relationships with executive function.

The purpose of the final part of this case was to determine if relationships between the executive functions and psychological constructs could be identified. The following relationships are believed to exist:

- Resilience and the flexibility executive function;
- Self-regulation and the sustained attention, task initiation, and goal-directed persistence executive functions.

The preceding exercise demonstrated that a pathway between non-cognitive skills and executive function can be formed when mediated by life skills and project management theory and practice. The next task is to determine that similar pathways using project management as a mediator, can be developed to allow for the strengthening of non-cognitive skills and/or character and/or executive function.

**Scenario 2: Time management (non-cognitive skill).** In the practice of project management, it is imperative that a “sense of urgency”—a mindset that all work must be completed in the shortest time possible, while still providing the expected content and quality—be instilled in all members of the project team. Guare et al. (2013) confirm this same need for time urgency in the context of developing the time management executive function and thereby the time management non-cognitive skill.

Time management appears to be a common component of non-cognitive skills,

life skills, project management practice and theory, and executive function. However, time management in project management would appear to include multiple executive functions. This would indicate that individual executive functions are atomic, meaning they have “no internal structure at [this] level of analysis” (atomic, n.d.), ergo the time management executive function should not be equated to project time management.

For the remainder of this narrative, the reader should refer to Figure 32 to trace the various steps in the process and the connections being made.

Looking back at the triple- and quadruple-constraint, (elapsed) time on any project is inseparably linked to the scope of work and the cost of resources. Nonetheless, these “constraints” are not of equal influence: the scope of work—the work that must be done—defines the boundary of the effort. Furthermore, without having a defined scope of work, “you'll never know when you're done.” In an education context, this would be the equivalent of a very detailed rubric, setting forth expectations but not necessarily defining the steps in doing the work. Supporting the scope of work is the work breakdown structure (WBS)—“a hierarchical decomposition of the work [to be done]” (PMBOK4, 2008, p. 444). The WBS provides a finer granularity of the steps needed to complete a work product as compared to the scope of work. A comparable instructional practice would be “chunking”, where large amounts of information are broken down to facilitate processing.

Once a WBS has been drafted, a detailed schedule can be developed. The processes to assist with this are found in the Time Management knowledge area and include: defining activities, sequencing activities, estimating the resources—for this



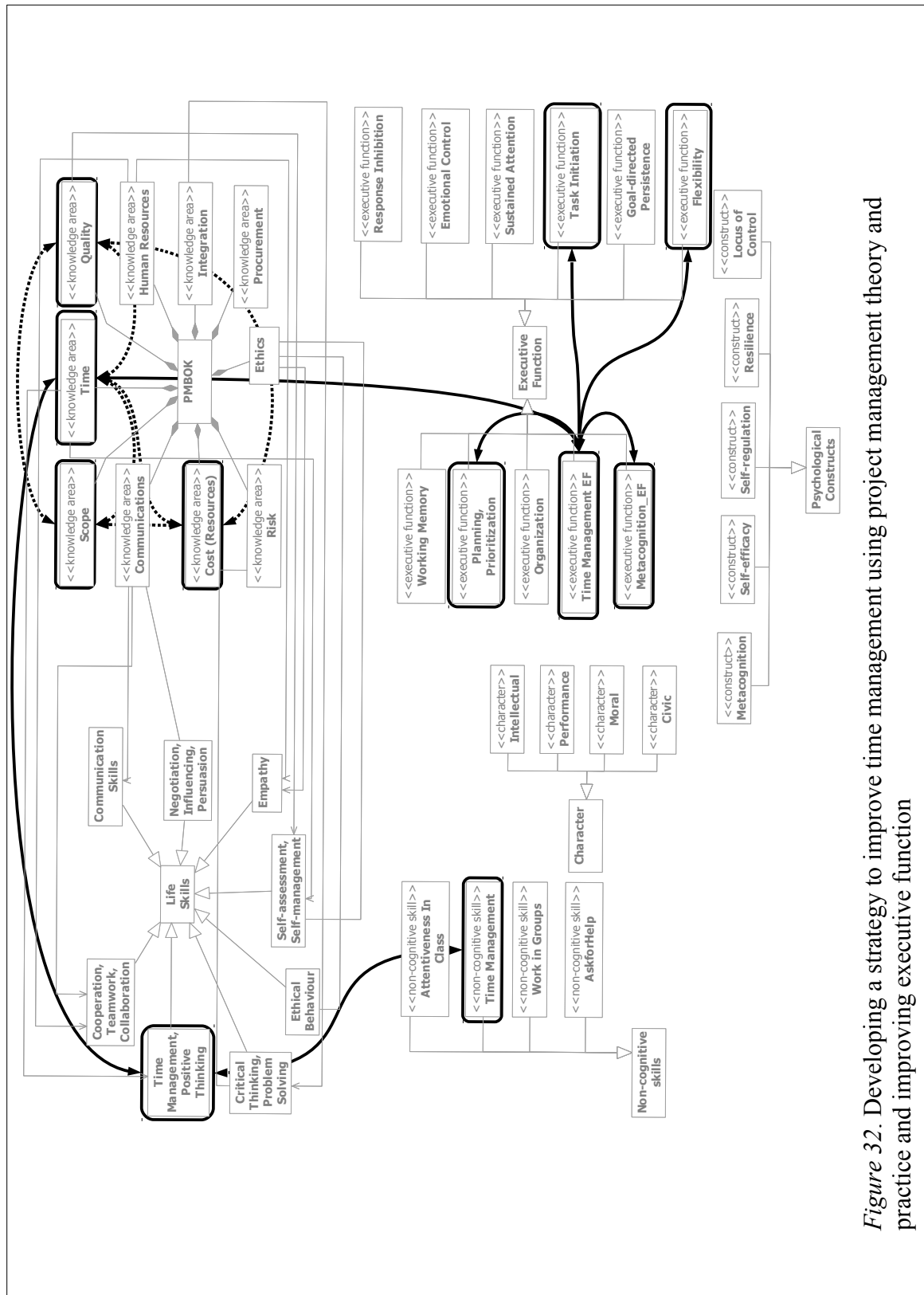


Figure 32. Developing a strategy to improve time management using project management theory and practice and improving executive function

model, hours—required for each activity, estimating the elapsed time needed to carry out an activity, and developing the schedule, which must take into account external dependencies, whether they are inputs from other members of the project group or outputs to others. Schedule development, if executed correctly, should provide an individual with a view on group dynamics, and, eventually, the skills to work within a group, another non-cognitive skill examined in this study. Performance character is enhanced by the expectation that only high quality work should be given to other team members. However, increased civic character—concern for the welfare of others—may be too much of a stretch for some adolescents. Figure 33 shows the time management model based on the preceding discussion.

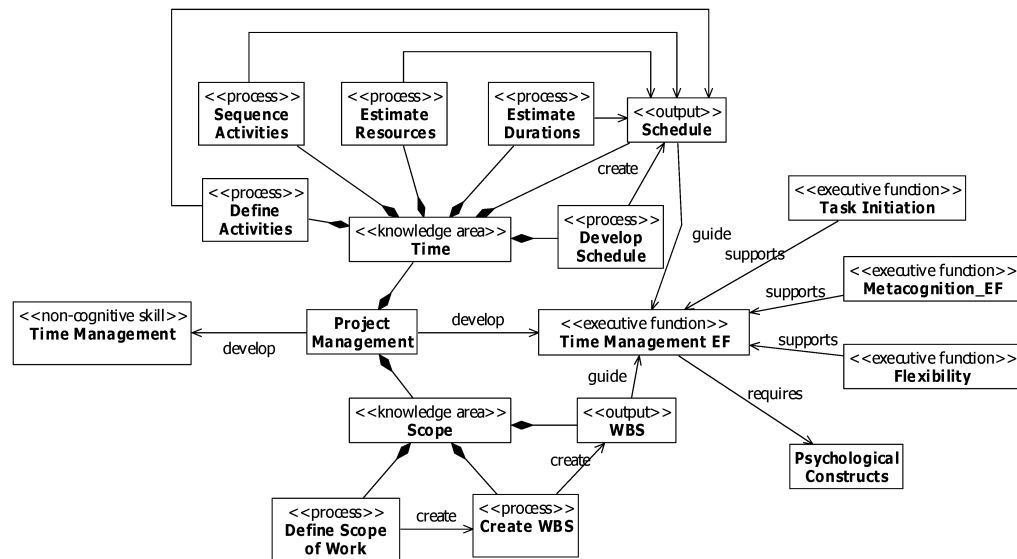


Figure 33. Integration of project management with executive function and psychological constructs to develop the *time management* non-cognitive skill development.

## **CHAPTER SIX: CONCLUSION**

In this exploratory qualitative study, parents of adolescent males were interviewed to identify their perceptions of factors they believed contribute to their sons' performance or underperformance in secondary school. Adolescent males were interviewed to understand their motivations for engaging in the behaviours identified by their parents. A rationale for the study is the decline in male enrolment in post secondary education, a phenomenon that started in the mid-1980s. Males now only represent about 43% of undergraduate populations throughout the Western world. Many of the more recent studies have focused on noncognitive skills as a major contributor to this decline. All of those studies were conducted using preexisting data sets.

The participants' noncognitive skills showed a weakness as predicted by the literature. The exception was that the young men showed a facility for working in groups, which may have been due to their continuous involvement in one or more competitive sports. The young men and their parents also perceived a lack of interest in nature and natural settings, as well as little interest in their larger community. Further, for the first time, discussion of executive function and how it might contribute to performance have been added to the discourse surrounding academic achievement and postsecondary enrolment. This is one of the few studies that has spoken directly with young men and their parents to understand their academic performance in the context of noncognitive skills with broader applicability to the low representation of males in postsecondary education.

The conceptual framework of the study centred on non-cognitive skills and

dimensions of character. The seminal study on non-cognitive skills (Jacob, 2002) was a statistical analysis of data collected for the U.S. National Longitudinal Survey in the period 1988-1992. Literature in the intervening years has mostly referenced this work, without adding a greater understanding of the role non-cognitive skills play in young men's academic lives. The non-cognitive skills that affected this study's participants negatively were time management, willingness to ask for help, and attentiveness in class. Working in groups was not an issue for the participants, but their strong involvement in competitive sports may be strengthening that skill for them. Future research is required to better understand if such a relationship does, in fact, exist. It is not known whether other, less active boys and young men would experience difficulties with those skills. Furthermore, the effects of social media (i.e., Facebook, Twitter, YouTube) were intentionally not studied. A study examining a possible association between social media use and ability to work in groups may be warranted.

Very few prior studies were found that examined character—as opposed to character education—as a contributor to academic performance. This study's results surrounding character were revealing. Three of the four dimensions of character studied might benefit from further attention in the young men's education. Parent and self-reports related to curiosity about nature, technology, and the natural sciences revealed a low interest in these areas suggesting the need to further enhance the young men's intellectual character. Apart from their athletics, the young men were not perceived as demonstrating great desire to excel at school with the aim of producing high quality work. Most of the study's adolescent male participants were not involved in their community in any way,

beyond the public service requirements of the Ontario curriculum, potentially indicating a reduced civic character. Perceptions related to moral character were tested by a hypothetical question related to the young men's witnessing of physical bullying. Here, everyone responded that they would intervene in some way. This may not be a definitive indicator of their moral compass, but it does suggest their willingness to come to the aid of one of their peers. Further study in this area is warranted to determine if the scenarios presented to the young men does indeed represent their moral character.

One domain that was not included in the original design of this research was executive function. It only arose during the throes of preparing the discussion section of the report. Nonetheless, it was surprising that executive function has not been part of the discourse so far. The addition of executive supported in part the proposed framework for using project management to assist with developing weak executive function.

A number of additional fields of study were included in this research: the young men's perceptions of their teachers; their perceptions of male teachers; and, aspects of the high school curriculum that they most and least enjoyed. There have been discussions in the public press regarding the merit of affirmative action in placing more males as teachers in the elementary grades, with the goal of these men serving as role models for boys. Those discussions often surround populations with high absentee-father rates. This study's participants came from homes where the young men's biological parents still lived in the home with them, therefore this study was not able to illuminate this issue any further. Nonetheless, when asked, the young men expressed no preference for male over female teachers. However, the young men did believe male teachers understood the

behaviours of adolescent males better than female teachers.

The results of two major standardized tests were released while this report was being prepared (EQAO, 2013; OECD, 2013). For Ontario and Canada respectively, each study indicated falling proficiency in mathematics, particularly for boys and young men. This issue was discussed at length in both reports and thus will not be repeated. However, it must be emphasized that, given math's central role in the natural sciences, technology, engineering, and business, it is strongly recommended that the current state of mathematics education be reviewed. Anyone who lacks an understanding of mathematics, male or female, is sure to limit their future education, career choices, and participation in a knowledge-based economy.

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[eng.cfm?LANG=E&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&](http://www12.statcan.gc.ca/english/census01/products/standard/profiles/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=1&PID=56187&PRID=0&PTYPE=55430,53293,55440,55496,71090&S=0&SHOWALL=0&SUB=0&Temporal=2001&THEME=57&VID=0&VNAMEE=&VNAMEF)

[GC=0&GID=0&GK=0&GRP=1&PID=56187&PRID=0&PTYPE=55430,53293,](http://www12.statcan.gc.ca/english/census01/products/standard/profiles/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=1&PID=56187&PRID=0&PTYPE=55430,53293,55440,55496,71090&S=0&SHOWALL=0&SUB=0&Temporal=2001&THEME=57&VID=0&VNAMEE=&VNAMEF)

[55440,55496,71090&S=0&SHOWALL=0&SUB=0&Temporal=2001&THEME=](http://www12.statcan.gc.ca/english/census01/products/standard/profiles/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=1&PID=56187&PRID=0&PTYPE=55430,53293,55440,55496,71090&S=0&SHOWALL=0&SUB=0&Temporal=2001&THEME=57&VID=0&VNAMEE=&VNAMEF)

[57&VID=0&VNAMEE=&VNAMEF](http://www12.statcan.gc.ca/english/census01/products/standard/profiles/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=1&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=1&PID=56187&PRID=0&PTYPE=55430,53293,55440,55496,71090&S=0&SHOWALL=0&SUB=0&Temporal=2001&THEME=57&VID=0&VNAMEE=&VNAMEF)

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## Appendix A

### Quick Reference to the Unified Modeling Language (UML)

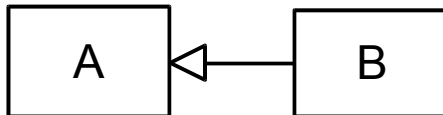
#### Objects

The fundamental building block of Literature and Theory Maps (LTM) is objects, which could represent: a major area of the literature, a concept or component of theory, or an author / scholar, to name but a few. Two objects A and B would be represented as:

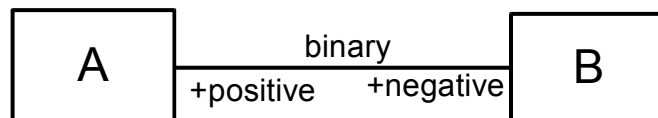


#### Relationships Between Objects

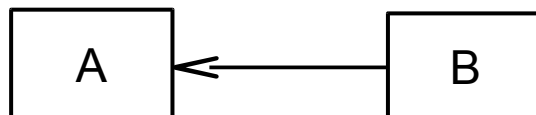
Object B is “a type of” or “a kind of” Object A (i.e., a square is “a type of” rectangle)



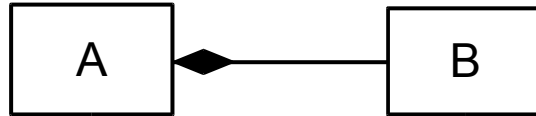
A non-directional relationship between objects A and B could be represented as:



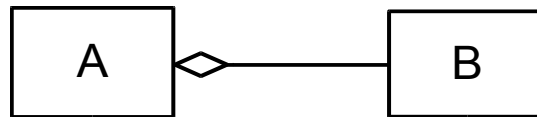
The directional relationship of “B influences A” would be represented as:



The specialized directional relationship B is part of A would be represented as:



The specialized directional relationship A “refers to” B (i.e., B is independent of A) would be represented as:



**Appendix B****Canadian Postsecondary Enrolments and Graduates**

Table B1

*Canadian University and College Enrolments by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	1,979,481	862,746	43.6	1,116,735	56.4	1.29	-253,989	-12.8
Personal improvement and leisure	25,104	10,548	42.0	14,556	58.0	1.38	-4,008	-16.0
Education	101,340	23,502	23.2	77,838	76.8	3.31	-54,336	-53.6
Visual and performing arts, and communications technologies	84,630	31,941	37.7	52,689	62.3	1.65	-20,748	-24.5
Humanities	363,327	149,760	41.2	213,567	58.8	1.43	-63,807	-17.6
Social and behavioural sciences and law	259,977	83,544	32.1	176,433	67.9	2.11	-92,889	-35.7
Business, management and public administration	349,728	157,638	45.1	192,090	54.9	1.22	-34,452	-9.9
Physical and life sciences and technologies	101,688	47,508	46.7	54,180	53.3	1.14	-6,672	-6.6
Mathematics, computer and information sciences	60,027	45,435	75.7	14,592	24.3	0.32	30,843	51.4
Architecture, engineering and related technologies	190,035	155,229	81.7	34,806	18.3	0.22	120,423	63.4
Agriculture, natural resources and conservation	28,308	13,908	49.1	14,400	50.9	1.04	-492	-1.7
Health, parks, recreation and fitness	229,875	59,946	26.1	169,929	73.9	2.83	-109,983	-47.8
Personal, protective and transportation services	41,280	25,032	60.6	16,248	39.4	0.65	8,784	21.3
Other instructional programs	144,165	58,752	40.8	85,413	59.2	1.45	-26,661	-18.5

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female



Table B2

*Canadian University Enrolments by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	1,263,750	541,014	42.8	721,704	57.1	1.33	-180,690	-14.3
Personal improvement and leisure	4,698	2,157	45.9	2,538	54.0	1.18	-381	-8.1
Education	84,543	20,448	24.2	64,047	75.8	3.13	-43,599	-51.6
Visual and performing arts, and communications technologies	49,521	17,925	36.2	31,551	63.7	1.76	-13,626	-27.5
Humanities	218,415	86,661	39.7	131,454	60.2	1.52	-44,793	-20.5
Social and behavioural sciences and law	215,868	74,397	34.5	141,384	65.5	1.90	-66,987	-31.0
Business, management and public administration	216,486	102,879	47.5	113,307	52.3	1.10	-10,428	-4.8
Physical and life sciences and technologies	96,522	44,835	46.5	51,675	53.5	1.15	-6,840	-7.1
Mathematics, computer and information sciences	38,715	28,233	72.9	10,464	27.0	0.37	17,769	45.9
Architecture, engineering and related technologies	108,837	84,747	77.9	24,045	22.1	0.28	60,702	55.8
Agriculture, natural resources and conservation	19,797	8,736	44.1	11,052	55.8	1.27	-2,316	-11.7
Health, parks, recreation and fitness	143,829	42,642	29.6	101,109	70.3	2.37	-58,467	-40.7
Personal, protective and transportation services	6,084	3,138	51.6	2,943	48.4	0.94	195	3.2
Other instructional programs	60,432	24,216	40.1	36,135	59.8	1.49	-11,919	-19.7

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female

Table B3

*Canadian College Enrolments by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	732,450	321,732	43.9	395,031	53.9	1.23	-73,299	-10.0
Personal improvement and leisure	20,547	8,391	40.8	12,018	58.5	1.43	-3,627	-17.7
Education	16,974	3,054	18.0	13,791	81.2	4.52	-10,737	-63.3
Visual and performing arts, and communications technologies	35,433	14,016	39.6	21,138	59.7	1.51	-7,122	-20.1
Humanities	146,655	63,099	43.0	82,113	56.0	1.30	-19,014	-13.0
Social and behavioural sciences and law	44,304	9,147	20.6	35,049	79.1	3.83	-25,902	-58.5
Business, management and public administration	133,929	54,759	40.9	78,783	58.8	1.44	-24,024	-17.9
Physical and life sciences and technologies	5,187	2,673	51.5	2,505	48.3	0.94	168	3.2
Mathematics, computer and information sciences	21,462	17,202	80.2	4,128	19.2	0.24	13,074	60.9
Architecture, engineering and related technologies	81,561	70,482	86.4	10,761	13.2	0.15	59,721	73.2
Agriculture, natural resources and conservation	8,535	5,172	60.6	3,348	39.2	0.65	1,824	21.4
Health, parks, recreation and fitness	86,292	17,304	20.1	68,820	79.8	3.98	-51,516	-59.7
Personal, protective and transportation services	35,292	21,894	62.0	13,305	37.7	0.61	8,589	24.3
Other instructional programs	96,276	34,536	35.9	49,278	51.2	1.43	-14,742	-15.3

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female

Table B4

*Canadian University and College Graduates by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	460,599	191,844	41.7	268,755	58.3	1.40	-76,911	-16.7
Personal improvement and leisure	2,433	1,074	44.1	1,359	55.9	1.27	-285	-11.7
Education	32,814	7,554	23.0	25,260	77.0	3.34	-17,706	-54.0
Visual and performing arts, and communications technologies	20,007	7,269	36.3	12,738	63.7	1.75	-5,469	-27.3
Humanities	57,123	21,516	37.7	35,607	62.3	1.65	-14,091	-24.7
Social and behavioural sciences and law	66,852	19,857	29.7	46,995	70.3	2.37	-27,138	-40.6
Business, management and public administration	100,086	41,967	41.9	58,119	58.1	1.38	-16,152	-16.1
Physical and life sciences and technologies	20,079	9,012	44.9	11,067	55.1	1.23	-2,055	-10.2
Mathematics, computer and information sciences	13,776	10,002	72.6	3,774	27.4	0.38	6,228	45.2
Architecture, engineering and related technologies	52,326	43,674	83.5	8,652	16.5	0.20	35,022	66.9
Agriculture, natural resources and conservation	8,196	4,200	51.2	3,996	48.8	0.95	204	2.5
Health, parks, recreation and fitness	64,515	13,494	20.9	51,021	79.1	3.78	-37,527	-58.2
Personal, protective and transportation services	15,639	8,946	57.2	6,693	42.8	0.75	2,253	14.4
Other instructional programs	6,750	3,273	48.5	3,477	51.5	1.06	-204	-3.0

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female

Table B5

*Canadian University Graduates by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	267,915	107,973	40.3	159,942	59.7	1.48	-51,969	-19.4
Personal improvement and leisure	951	495	52.1	456	47.9	0.92	39	4.1
Education	28,437	6,966	24.5	21,471	75.5	3.08	-14,505	-51.0
Visual and performing arts, and communications technologies	10,473	3,594	34.3	6,879	65.7	1.91	-3,285	-31.4
Humanities	24,855	8,820	35.5	16,035	64.5	1.82	-7,215	-29.0
Social and behavioural sciences and law	51,819	16,962	32.7	34,857	67.3	2.06	-17,895	-34.5
Business, management and public administration	58,452	26,868	46.0	31,584	54.0	1.18	-4,716	-8.1
Physical and life sciences and technologies	18,717	8,280	44.2	10,437	55.8	1.26	-2,157	-11.5
Mathematics, computer and information sciences	7,638	5,244	68.7	2,394	31.3	0.46	2,850	37.3
Architecture, engineering and related technologies	22,284	17,244	77.4	5,040	22.6	0.29	12,204	54.8
Agriculture, natural resources and conservation	5,301	2,490	47.0	2,811	53.0	1.13	-321	-6.1
Health, parks, recreation and fitness	32,778	7,869	24.0	24,909	76.0	3.17	-17,040	-52.0
Personal, protective and transportation services	1,671	831	49.7	840	50.3	1.01	-9	-0.5
Other instructional programs	4,539	2,313	51.0	2,226	49.0	0.96	87	1.9

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female

Table B6

*Canadian College Graduates by Sex and Field of Study (2011)<sup>1,2</sup>*

Instructional Program	Total	Male (M)	% of Total	Female (F)	% of Total	Ratio (F:M)	Difference <sup>2</sup>	% of Total
Total, instructional programs	192,687	83,871	43.5	108,816	56.5	1.30	-24,945	-12.9
Personal improvement and leisure	1,479	576	38.9	903	61.1	1.57	-327	-22.1
Education	4,380	588	13.4	3,792	86.6	6.45	-3,204	-73.2
Visual and performing arts, and communications technologies	9,540	3,678	38.6	5,862	61.4	1.59	-2,184	-22.9
Humanities	32,271	12,699	39.4	19,572	60.6	1.54	-6,873	-21.3
Social and behavioural sciences and law	15,033	2,898	19.3	12,135	80.7	4.19	-9,237	-61.4
Business, management and public administration	41,631	15,099	36.3	26,532	63.7	1.76	-11,433	-27.5
Physical and life sciences and technologies	1,365	735	53.8	630	46.2	0.86	105	7.7
Mathematics, computer and information sciences	6,138	4,758	77.5	1,380	22.5	0.29	3,378	55.0
Architecture, engineering and related technologies	30,042	26,433	88.0	3,609	12.0	0.14	22,824	76.0
Agriculture, natural resources and conservation	2,898	1,710	59.0	1,188	41.0	0.69	522	18.0
Health, parks, recreation and fitness	31,737	5,625	17.7	26,112	82.3	4.64	-20,487	-64.6
Personal, protective and transportation services	13,968	8,115	58.1	5,853	41.9	0.72	2,262	16.2
Other instructional programs	2,208	957	43.3	1,251	56.7	1.31	-294	-13.3

<sup>1</sup> Source: Statistics Canada (2013d, 2013e, 2013f)<sup>2</sup> Male minus Female

**Appendix C**  
**Median Incomes**

Table C1

*Median Incomes for Lone Parent Families*

<b>Family type</b>	<b><u>Median total income</u></b>				
	<b>1980<sup>1,2</sup></b>	<b>1990<sup>1,2</sup></b>	<b>2000<sup>1,2</sup></b>	<b>2005<sup>1,2</sup></b>	<b>2010<sup>3</sup></b>
Lone-parent families	35,721	37,222	40,453	42,836	54,400
Female lone-parent families	29,092	33,633	37,659	40,148	51,100
Male lone-parent families	59,176	56,663	54,481	56,756	70,400

1 Source: Statistics Canada (2009b)

2 Values for 1980 to 2005 adjusted to 2010 (Bank of Canada, 2014)

3 Source: Statistics Canada (2013g)

**Appendix D**

**Knowledge Areas of the PMBOK**





Figure D1. The PMBOK Integration Management knowledge area overview. Adapted from PMBOK5 (2013, p. 65).

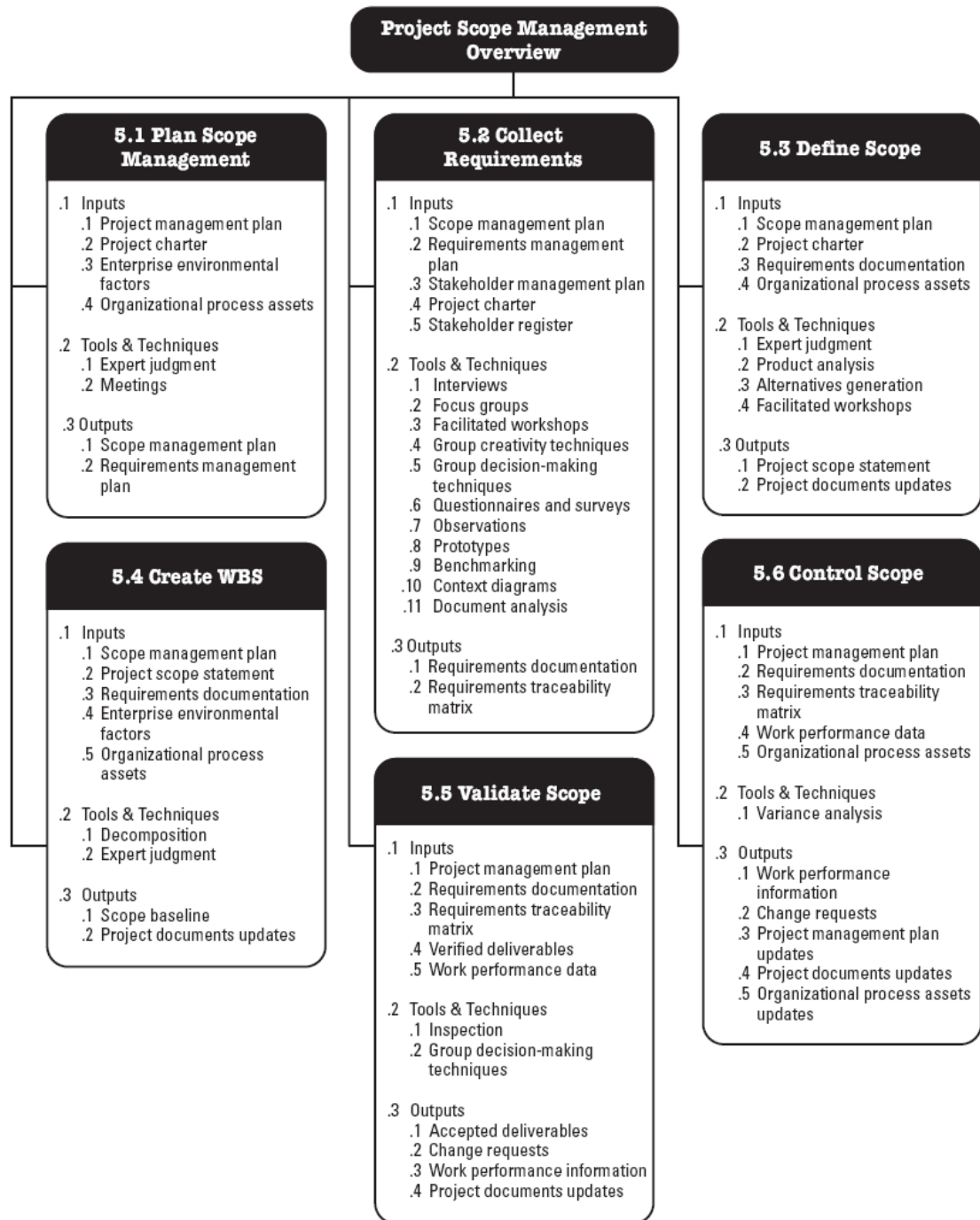


Figure D2. The PMBOK Scope Management knowledge area overview. Adapted from PMBOK5 (2013, p. 106).

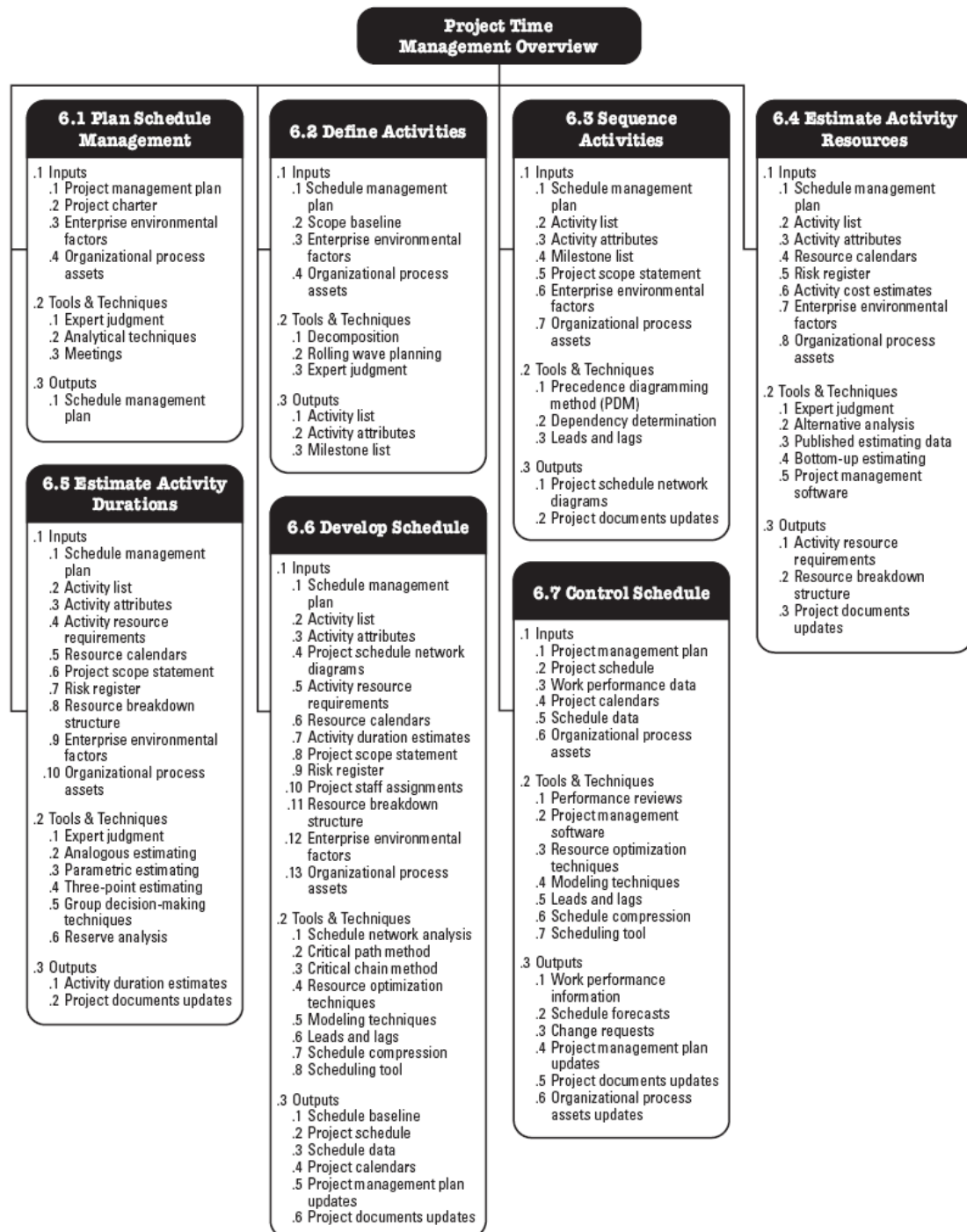


Figure D3. The PMBOK Time Management knowledge area overview. Adapted from PMBOK5 (2013, p. 143).

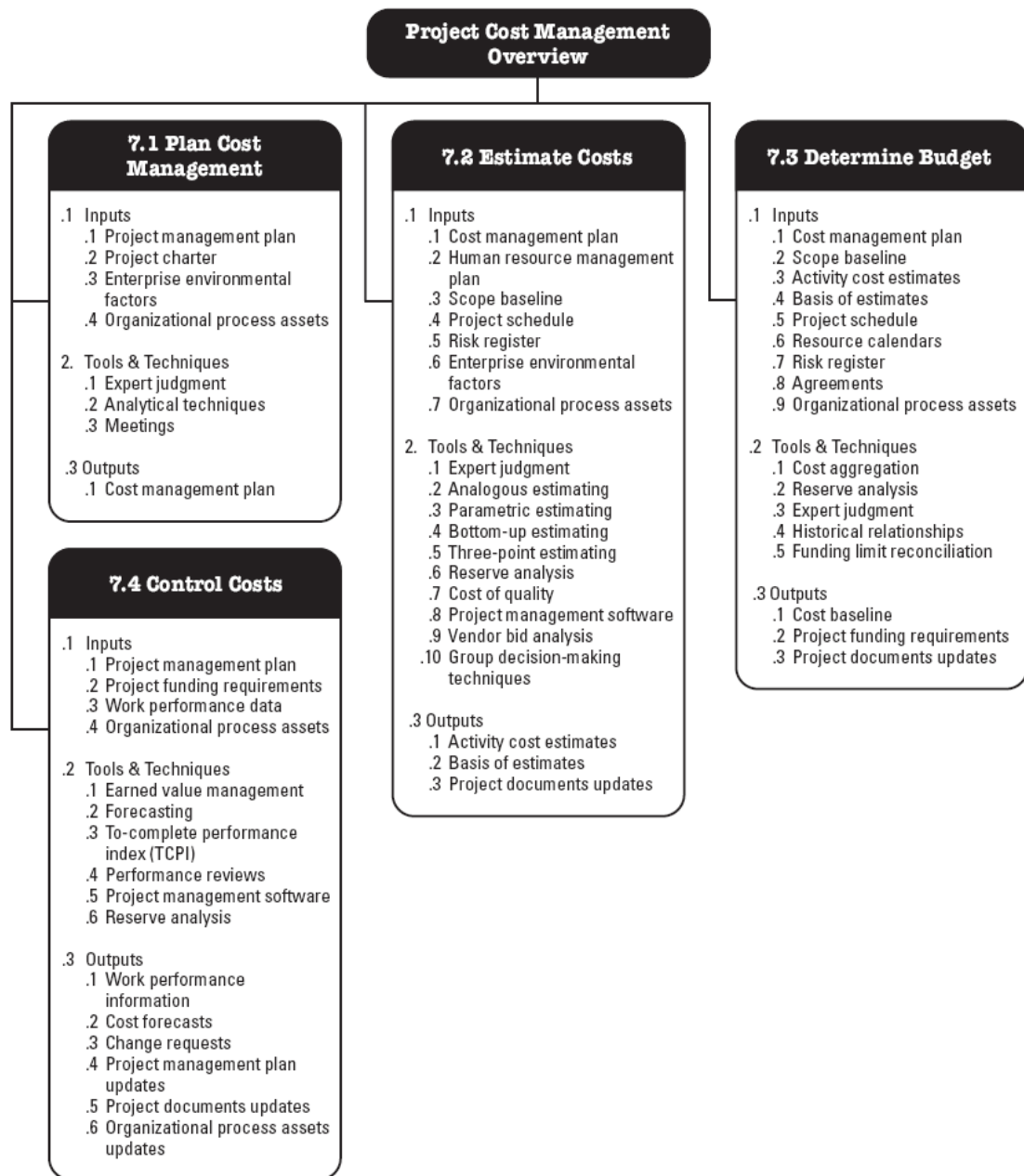
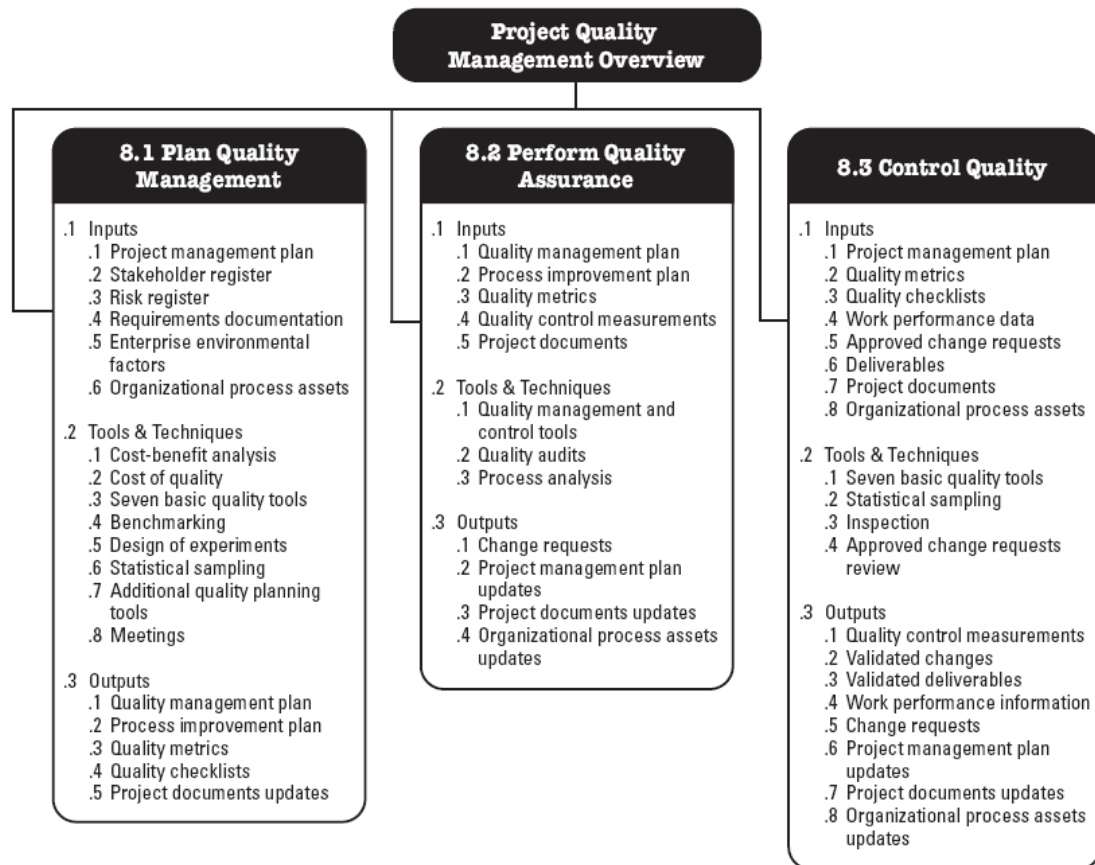


Figure D4. The PMBOK Cost Management knowledge area overview. Adapted from PMBOK5 (2013, p. 194).



*Figure D5.* The PMBOK Quality Management knowledge area overview. Adapted from PMBOK5 (2013, p. 230).

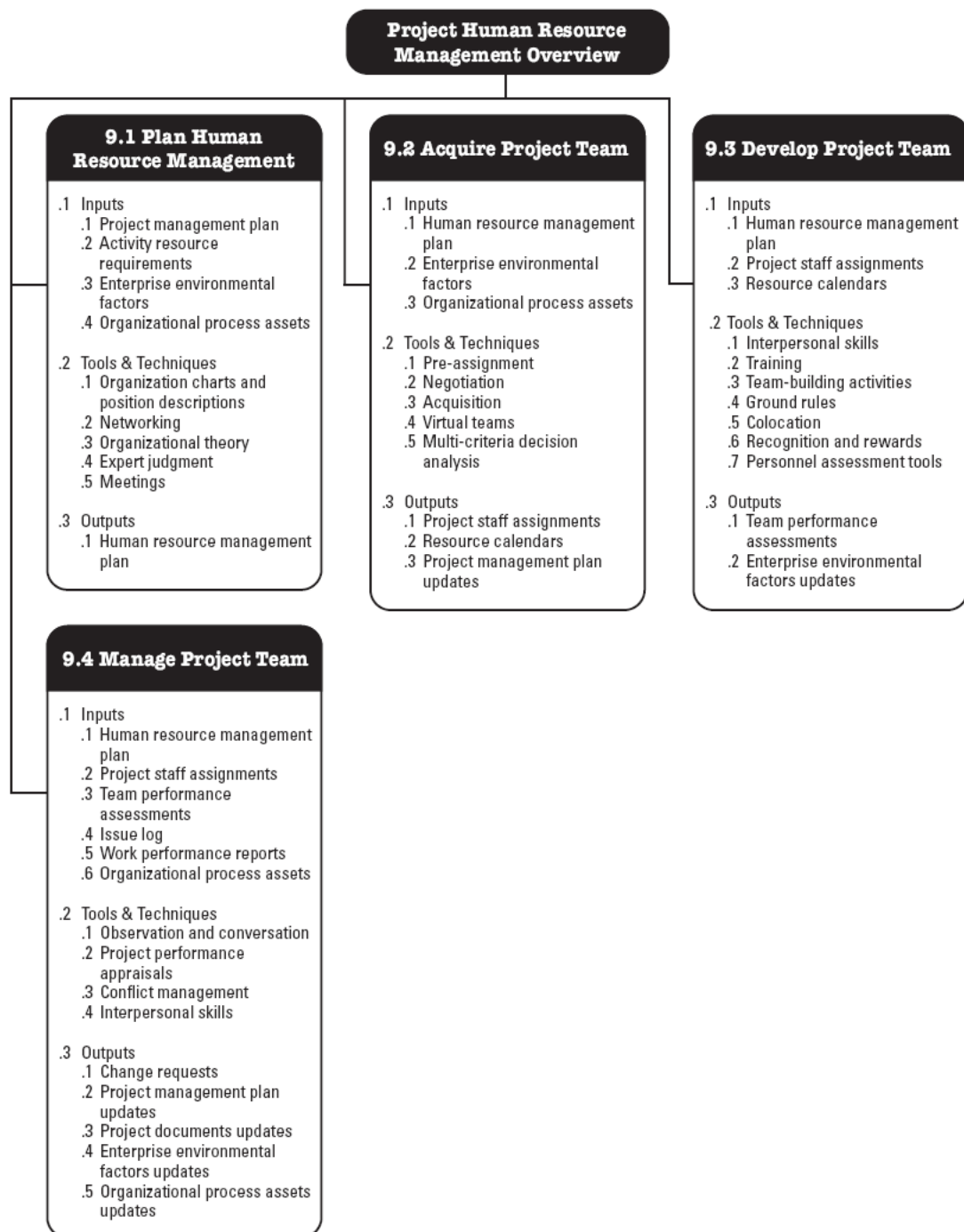
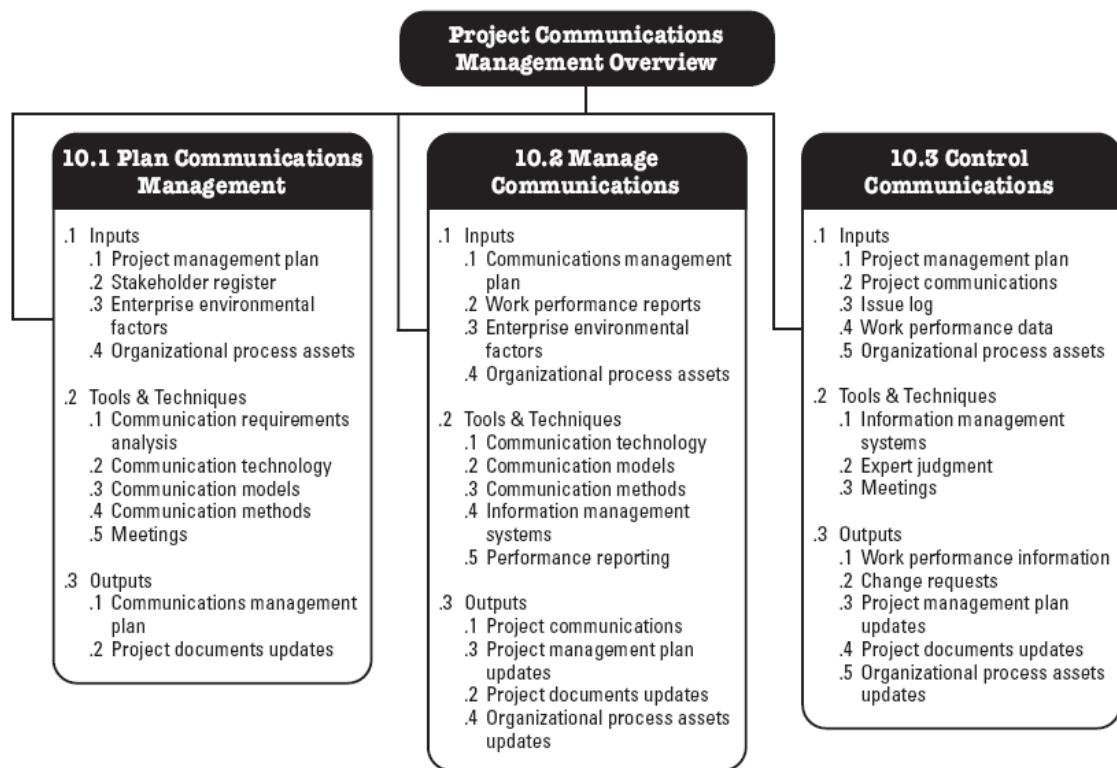


Figure D6. The PMBOK Human Resources Management knowledge area overview. Adapted from PMBOK5 (2013, p. 257).



*Figure D7.* The PMBOK Communications Management knowledge area overview.  
Adapted from PMBOK5 (2013, p. 288).

**Appendix E**  
**Parent Interview Script**



**Perceptions of adolescent males and their parents as to factors  
that influence the young men's academic performance**

**Doctoral Research Project Conducted By  
Patrick Tierney**

**Parent Interview Script**

Prior to the interview, the following information will be collected for each parent participant:

- Name
- Sex
- Relationship to boy or young man (Parent, Foster Parent, Guardian, Sibling, Aunt/Uncle, Other)
- The parent's age as of 1 March 2013
- Parent's highest education attainment
- Son's name
- What grade is the boy or young man in? (6-12, Post-secondary, Not in school, Don't know, Other)

Interview / recording begins

Hello and thank you for agreeing to participate in study.

Did you have a chance to read the consent form?

(If yes, ask if interviewee understood stipulations. If no, advise interviewee of stipulations.)

During this interview:

- You may choose to not answer any question for any reason
- You may stop the interview at any time for any reason

Do you understand these rights?

Do you consent to participate in this interview?

Record verbal consent to participate.

Are you aware that a gender imbalance in post-secondary education exists?

Assuming that gender imbalance in post-secondary education exists, does it matter to you? Why?

Is it important for you that your son attend postsecondary education? Why?

Has your son ever expressed his personal attitude toward school?  
If yes, what is it? If not, what do you think it is on the basis of his behavior(s)?

How is your son performing at school?

Non-cognitive skills: Describe your son's facility regarding:

- Attentiveness in class
- Time management / Organizational skills
- Ability to work with others
- Willingness to ask for help with his work

What does your son think of his teacher(s)?  
On average, how many male teachers does your son have?  
Do you think this has any bearing on his attitude toward school?

Which school subjects does your son enjoy or find interesting?

Which school activities / subjects does your son least enjoy or find the least interesting?

Does your son participate in  
social events  
community groups, or  
organized sports.

How often does your son have regularly scheduled physical activity in school?

Is your son curious about the world around him:  
community / society?  
the natural world?

Are there any additional comments you would like to add regarding the various topics we have just discussed or anything regarding school or your life outside of school?

Thank you.

**Appendix F****Minor Child Verbal Assent and Interview Script**

**Perceptions of adolescent males and their parents as to factors  
that influence the young men's academic performance**

**Doctoral Research Project Conducted By  
Patrick Tierney**

**Minor Child Verbal Assent & Interview Script**

Prior to the interview, the minor child's assent to participate will be sought. The script is as follows.

[Interviewer] Hello. My name is Patrick and I am in school, sort of like you. Thank you for meeting with me today.

[Interviewer] I'm studying adolescent males' ability / probability of getting into college or university. As part of this work, I will be asking you about some of your experiences at school and outside of school. This session will be just like a conversation you might have with your friends.

**Get minor child's assent**

[Interviewer] Your [mother/father/guardian/other] has said that you agreed to participate in this interview. Is that true?

Record minor child's verbal assent to participate.

[Interviewee] Yes/No or similar affirmative/negative reply.

- If yes, the interview will proceed.
- If no, the session ends and the participant is thanked for the honesty and taking the time to meet with me.

Once assent is obtained, the following information will be collected for each participant:

- First name
- Age
- Current grade level

[Interviewer] If you are uncomfortable about any question, you do not have to answer it. Do you understand what it means to be uncomfortable? If the minor responds "no": uncomfortable means uneasy, stressful, irritating, etc. Give example.

You may also stop our discussion at any time for any reason. If you choose to not answer a question or decide to stop our discussion, no one will get mad or nothing bad will happen.

[Interviewer] Is it okay if we start our discussion?

**Interview**

How are you doing in school?

Which school subjects do you most enjoy or find most interesting?

Which school subjects do you least enjoy or find the least interesting?

[If not previously answered...] Do you like to read? If yes, what and why? If not, why?

Describe the following about yourself

Attentiveness in class

Time management / Organizational skills

Ability to work with others

Do you ask for help with your schoolwork?

What do you think of your teacher(s)?

On average, how many male teachers do you have? Is it important for you to have male teachers?

Would you like to attend college or university? Why?

Have you ever thought about what career or occupation you would like to have as an adult?

Describe your participation in

social events,

community groups, or

organized sports.

How often do you have regularly scheduled physical activity in school or outside of school?

Are you curious about the world around you:

community / society?

The natural world?

[Interviewer] We're done with our conversation. Thank you for all your valuable inputs and insights.

## **Appendix G**

### **Pilot Study**

JointPhD Doctoral Seminar 2, Summer 2012  
Assignment 5, Practice Quantitative Project

Exploring the gender imbalance in postsecondary enrolments

Patrick Tierney  
Brock University  
27 July 2012

Asymmetric gender populations in post-secondary education are well known and documented in several empirical studies (Adebayo, 2008; Christofides, Hoy, & Ling, 2009; Evers, Livernois, & Mancuso, 2006; Jacob, 2002) and the public press (Intini, 2006; Sommers, 2000; Sommers, 2001). In 2011, aggregate enrollments in most North American universities have a 60:40 ratio (females to males); some academic units can have ratios of 70:30 or higher. Because the de-industrialization of Western societies has resulted in a transition to primarily knowledge-based economies, higher levels of educational attainment are now required for all members of the workforce (Card, Payne, & Sechel, 2011).

The roots of gender asymmetric enrolments in post-secondary education (PSE) are not clearly understood. Some possible causes of the imbalance have been examined, from statistical to behavioral and character perspectives. Card, Payne, and Sechel's (2011) statistical study, which attributed differential application rates to postsecondary institutions as a contributor, did not examine the underlying reasons as to why young males did not even attempt to apply. Several studies (Evers, Livernois, & Mancuso, 2006; Jacob, 2002) suggested the evidence is clearer that school-age girls have better non-cognitive skills--desirable qualities that do not depend on acquired knowledge--than boys of similar age.

### **Purpose of the Study and Research Questions**

The purpose of this quantitative research study was to pilot-test a questionnaire for identifying non-cognitive skills and other behaviors exhibited by boys and young women which may be contributing factors to the gender imbalance in post secondary education enrollments. The study addressed the research questions:

12. What non-cognitive skills do boys and young exhibit that may contribute to the gender imbalance in post-secondary education?
13. What behaviors do boys and young exhibit that may contribute to the gender imbalance in post-secondary education?

### **Review Of The Literature**

A number of causes for the gender imbalance in PSE have been identified, including: application rates to PSE of females exceeding the rates of males; girls and young women have better non-cognitive skills at a younger age when compared to similar aged boys and young men; changes in the K-12 curriculum over the last several decades may have resulted in girl-friendly, boy-unfriendly classroom environments; and, literacy rates of males have been steadily declining over the last 20 years or more. This study focuses non-cognitive skills and other behaviors which may contribute to the gender imbalance.

### **The Post-secondary Gender Imbalance**

The gender imbalance in post-secondary education (PSE) is not a recent phenomenon. The last time female to male enrollment ratios were evenly split occurred in the early- to mid-1980s (Card, Payne, & Sechel, 2011, p. 3; Intini, 2006). The gap has widened to such a degree that in 2006, 59% of Canadian undergraduates are women. Some disciplines have even higher ratios: 68% in social sciences and 83% in English. Professional programs, traditionally male bastions are seeing similar trends: 59% of medical school and 53% of law school graduates are female (Intini, 2006).



There is cause for concern because, as Card et al. suggest, the long term earnings potential of half the population could be materially reduced. This may translate into a general reduction in the standard of living in Western economies over the long-term. Examining data from the Canadian 2006 census points to such a trend. Over the period from 1980 to 2005, the median income of all females with university degrees went from 65% of all males with a university degree in 1980 to 71% of all males with university degrees in 2005 (Statistics Canada, 2009a). In reviewing the data for all lone-parent families, the female to male median income ratio rose from 54% in 1980 to 71% in 2005 (Statistics Canada, 2009b). Despite the narrowing of the income gap over the period, female lone-parent families' median income was still only 71% of male lone-parent families. Further troubling data are the trends: between 1980 and 2000, the gap narrowed by an average of 3% per year; from 2000 to 2005, the gap narrowed by only 0.4% per year, signaling a slowing and possible stagnation of the income gap. The results from the 2011 census, due in Fall 2012, will be needed to confirm if a stagnation has actually taken hold.

**Non-cognitive skills.**<sup>4</sup> Non-cognitive skills are desirable qualities that do not depend on acquired knowledge. There is no evidence that one gender is inherently more or less academically able in cognitive terms. Non-cognitive skills increase the likelihood of getting good grades and, in turn, the likelihood of meeting the academic admission requirements for tertiary education (Evers, Livernois, & Mancuso, 2006, p.9). Jacob (2002) used data from a U. S. longitudinal study of a nationally representative cohort of eighth grade students survey every two years over the period 1988-1994 inclusively (p. 590). The contribution of two factors were examined—the premium of post secondary education on income (i.e. increased wages due to post secondary attainment), and, non-cognitive skills—on the gender imbalance. A major conclusion of Jacob's study was that “[t]he effect of non-cognitive skill is comparable in magnitude to socio-economic status and cognitive ability. Given the importance in [university] attendance decisions, it is likely that non-cognitive factors influence employment, occupation choice, and a variety of other labor market outcomes” (p. 597).

### Character Education<sup>5</sup>

Character is being “firmly secured in one’s own individual constitution, in such a way that one’s reliability in making good practical choices depends as little as possible on contingent external factors”

(Merrit cited in Pamental, 2010, pp. 149150).

Character Education can have a multitude of nuanced interpretations. Many would consider moral fortitude, with its basis in religious or philosophical traditions, as the cornerstone of character education. Others might see it as a vehicle for teaching citizenship and patriotism. Still others might see it as enhancing resilience to withstand the

4 This section has been taken from my preliminary research proposal developed for the Research Proposal Colloquium course (Brock University course number EDUC 7P69).

5 This section has been taken from the paper written for my Directed Studies course (Brock University course number EDUC 7P51).

vicissitudes of everyday life. Shields (2011, p. 49) proposes a definition that is more encompassing: teaching individuals to be “competent, ethical, engaged and effective member[s] of society.” He further poses the question “Isn’t that what we want from our education system?” One must assume that the answer to this, possibly rhetorical, question is “yes”.

Shields (2011) offers a model of character composed of four character elements: intellectual, moral, civic, and performance character.

**Intellectual character (IC)** is “the overarching conglomeration of habits of mind, patterns of thought, and general dispositions toward thinking that not only direct but also motivate one’s thinking-oriented pursuits” Ritchhart (2002, xxii). Ritchhart identified six dispositions as central to IC: curiosity, open-mindedness, metacognitive, strategic, skeptical, truth-seeking.

**Moral character** reflects a disposition to seek the good and right. It is rooted in a basic desire for goodness. In situations of choice and conflict, the person of moral character gives priority to moral over nonmoral considerations. The goal [of character education] is to develop a disposition to seek goodness, not inculcate a specific list of preferred virtues” (Shields, 2011, p. 50).

**Civic character.** “[C]itizenship is not simply a passive state of entitlements. [It] is one of the fundamental roles to be learned by men and women as they deliberate with one another about matters pertaining to the public good” (Welton, 2005, p. 150).

**Performance character** “refers to the dispositions, virtues, or personal qualities that enable an individual to accomplish intentions and goals....It includes such qualities as perseverance, diligence, courage, resilience, optimism, initiative, and attention to detail...These performance virtues lead to high-quality effort and work. Those with well-developed performance character take pride in what they do and seek to make it the best that it can be” (Shields, 2011, p. 52).

### **Summary**

The gender balance has been shown to be very real, with the gap steadily increasing for three decades or more. Research has linked non-cognitive skills and other behaviors to boys' and young men's reduced academic performance compared to females of a similar age. Character education, which has been gaining recognition as one approach to teach those very necessary skills to all children, but boys and young men may stand to benefit the most from it. However, before education systems embark on such a Herculean effort, further study needs to be done to confirm that non-cognitive skills are still a strong contributor to the gender imbalance. Such is the intent of this study.

### **Methodology**

This section presents the research design of the study, beginning with a description of the approach used. Following that is a description of the study participants, the research instrument(s), the analysis methods used, and the ethical issues with regards to the participants and the study as a whole.

### **Research Design**

As per the requirements of the study sponsor, a quantitative approach was used. Quantitative research: measures objective facts; focuses on variables; requires reliability and be value free; separates data and theory; is independent of context; uses many cases

or subjects; uses statistical analysis; and, requires that the researcher be detached (Neuman, 2006, p. 13). Additionally, the study is non-experimental because “it describes existing phenomena without changing some condition to affect [participants'] responses” (McMillan, 2000, p. 177).

### **Study Participants**

The participants were a convenience sample of Ph.D. students taking part in seminar courses at Lakehead University in July 2012. The group numbered approximately 35 individuals. The female to male ratio was about 80:20. Since all participants were Ph.D. students, it can be reasonably assumed that nearly all had attained at least one master's degree or an equivalent.

It is important to note that the questionnaire asked the participants about a boy or young man they know. Apart from asking the participants' sexual identity and whether or not they knew a boy or young man between 12-18 years of age, no other data was gathered on the participants themselves.

### **Instrumentation**

A single research instrument was used for the study, a quantitative questionnaire. See the Appendix. Table G1 provides the informational objective and the data types generated (i.e., nominal, ordinal, scale) of each question.

### **Data Analysis**

Analysis of the questionnaire data incorporated the following parameters with respect to the population and data types:

- the study population is nonparametric;
- the participants are a single group, hence “within group” analyses will be applied;
- the majority of the data are categorical (nominal and ordinal).

The Student Version of the SPSS 16 software package was used to conduct the statistical analysis of the questionnaire data. Descriptive statistics were developed for both the study participants and the sample target--boys and young men between 12-18 years of age known to the participants. Analysis of skills and behaviors exhibited by the boys and young men described in the questionnaire were analyzed with Chi-Square test as a correlational probe (Huck, 2012, pp. 417-418). In all cases, a 95% confidence interval was used.

### **Data Collection Procedures**

The maximum number of potential participants was 35, consisting of all students in both the Doctoral Seminar 1 and Doctoral Seminar 2 courses in the Joint PhD program. The courses in 2012 were held at Lakehead University in Thunder Bay, Ontario. An on-line survey was made available to the participants: the instrument was hosted by the SurveyMonkey website (<http://www.surveymonkey.com/s/MTHSXW9>). All questionnaires were completed on 10 July 2012.

### **Ethical Considerations**

Approval was received from the Lakehead University Research Ethics Board (LUREB) to conduct this survey. The LUREB gave its approval with the following stipulations: participation in the survey was voluntary; participants could choose to not answer any question; participants could withdraw from the study at any time without

Table G1.

*Study Questionnaire Details*

Question Text	Information Sought	Data Type
Which best describes you? Choices: Male   Female   Other	The sex of the participant. Only one choice can be selected.	Nominal
Do you know any boys or young men who are between the ages of 12 and 18 years as of 1 July 2012? Choices: Yes   No	If they do not know a boy or young man meeting the requirements, the participant is asked to submit their responses.	Nominal
What is your relation to this individual? Choices (one only): Parent   Foster Parent   Sibling   Aunt/Uncle   Friend   Teacher   If Other, please specify	What is the participant's relationship with the boy or young man about whom they are responding	Nominal
How old is the individual as of 1 July 2012? If you don't know the individual's exact age, please provide your best estimate.	The age of the boy or young man about whom the participant is responding.	Scale
Is this individual a member of a visible minority? Choices: Yes   No	Some visible minorities are at higher risk to perform poorly?	Nominal
What grade is this individual in? Choices (one only): 6   7   8   9   10   11   12   Post-secondary   Not in school   Don't know   Other, please specify	The grade level of the individual, if they are still attending school	Nominal (If not for the last two options, this could have an ordinal value, since progression over time is meaningful)
How is this individual performing in school? Choices (one only): Excellent   Good   Average   Poorly   Failing   Don't know	Poor performance in school can be an indicator of insufficient non-cognitive skills (Jacob, 2002).	Ordinal ( <i>Don't know</i> will be treated as a missing value since it doesn't contribute to the analysis)
Does this individual exhibit any of the following skills? Choices: Yes   No   Don't know.	Information on specific non-cognitive and cognitive skills of the individual.	Nominal
Works well with others	Non-cognitive skill	
Manages time well	Non-cognitive skill	
Asks for assistance when needed	Non-cognitive skill	
Plays a musical instrument	Demonstrates the ability to learn a complex behavior	

Table G1 (cont'd)

*Study Questionnaire Details*

<b>Question Text</b>	<b>Information Sought</b>	<b>Data Type</b>
Plays organized sports	An alternative form of working with others	Nominal
Does this individual exhibit any of the following behaviors? Choices: Yes   No  Don't know.	Information on specific non-cognitive skills and character indicators.	
Behaves well in class	Non-cognitive skill	
Likes to read (fiction, graphic novels, comic books)	Literacy, intellectual character indicator	
Participates in social events	Non-cognitive skill	
Is involved in the community (Scouts, Cadets, or other community or service groups)	Civic character indicator	
Is generally curious about the world around him	Intellectual character indicator	
Likes to travel / visit new places	Intellectual character indicator	
Has been involved with the police or the justice system	Moral character indicator	
Has taken drugs or consumed alcohol	Moral character indicator	

penalty. The LUREB also required that a copy of the data be sent to Dr. Paul Berger for archiving.

### **Results and Discussion**

This section reports the data collected and the statistical analysis of those data interleaved with discussions of those analyses. Three primary areas are reported: descriptive statistics of the participants; descriptive statistics of the sample target; and, Chi-Square tests as a correlational probe of the skills and behaviors of the sample target.

The maximum number of questionnaires that could have been completed is 35—the combined enrollment in Doctoral Seminars 1 and 2. Thirty surveys were completed, giving a response rate of 85.7%.

#### **Study Participants**

The breakdown of the sex identity for  $N=30$  participants was: 5 (16.7%) as male; 25 (83.3%) as female; 0 (0%) as other. When asked if they knew a boy or young man in the target population, 21 (70%) replied yes, 9 (30%) replied no. A chi-squared test was run to assess the presence of an association between the sex of the participants and whether or not they knew a boy or young man who fell within the target population. The result was  $X^2=4.888$ ;  $df=1$ ;  $p=0.028$ , meaning the difference between males and females was significant. This result could imply several factors: female participants just don't know as many boys or young men as the male participants; or, possibly, some female participants may be offended by the research topic and chose “No” so that they didn't contribute anything further to the study. (Choosing “No” meant not continuing the questionnaire.)

With 9 participants indicating they did not know a member of the target population, the sample size for the balance of the analysis was reduced to  $N=21$ . When the remaining participants were asked about their relationship with a particular boy or young man in the sample target, 2(9.5%) were parents; 1(4.8%) were foster parents; 2(9.5%) were an aunt or uncle; 5(23.8%) were a friend; 4(19.0%) were a teacher; 7(33.3) identified other relationships (Cousin; Social Worker; Neighbour; Mentor x 2; Vice Principal; Great Nephew).

Fraenkel and Wallen ( 2006, p. 106) suggest that “any sample that has less than 20 to 30 individuals within it is too small.” Thus, with  $N=21$ , any indications of significance or non-significance in the balance of this report must be considered suspect due to the low sample size.

#### **Sample Target**

This section reports the descriptive statistics for the sample target. Specific aspects include: age, their membership in a visible minority, their current grade level, and their performance in school.

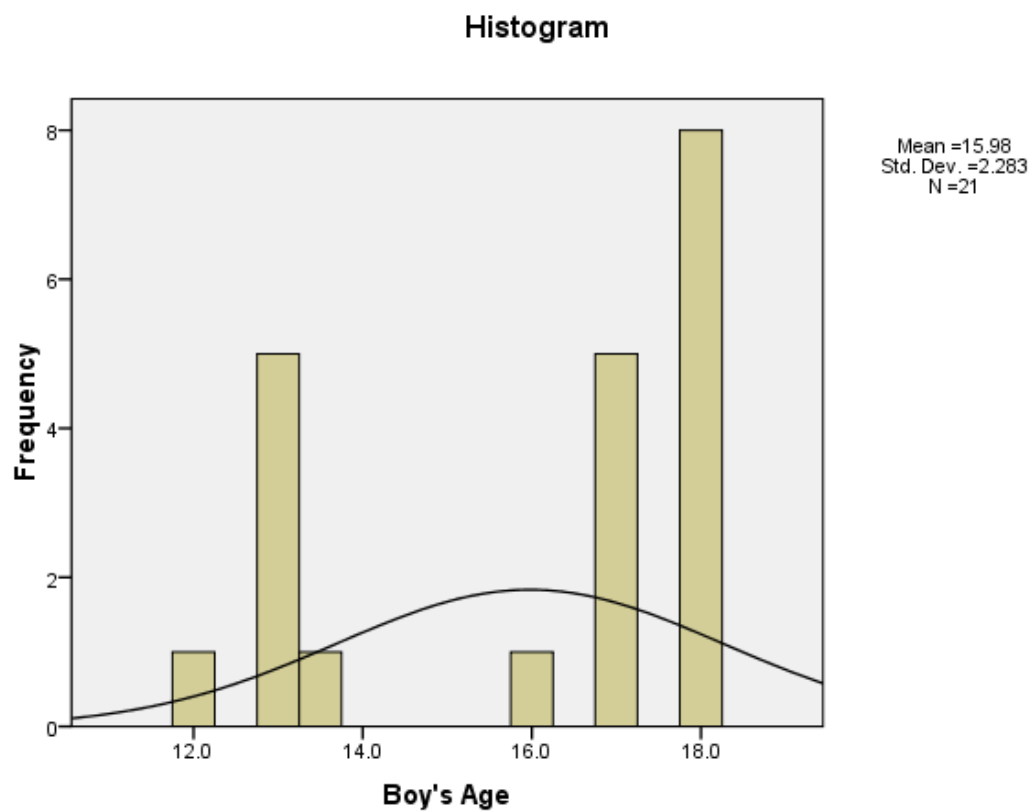
#### **Descriptive statistics**

**Age.** The ages of the sample target and the frequency of those ages are listed in Table G2. Figure 1 shows the histogram of those ages with a normal distribution superimposed. Visual inspection demonstrates that the distribution is non-parametric. This is confirmed by testing for normality. With  $p=0.000$  for the Shapiro-Wilk test, normality is not assumed.

Table G2

*Ages and Frequencies of the Sample Target*

Age	Frequency	Percent	Valid Percent
12	1	4.8	4.8
13	5	23.8	23.8
13.5	1	4.8	4.8
16	1	4.8	4.8
17	5	23.8	23.8
18	8	38.1	38.1
Total	21	100.0	100.0



*Figure G1.* Histogram of sample target ages.



Table G3

*Grade Level Frequencies of the Sample Target*

Grade Level	Frequency	Percent
6	2	9.5
8	4	19.0
9	1	4.8
11	2	9.5
12	8	38.1
Post-secondary	3	14.3
Not in school	1	4.8
Total	21	100.0

**Member of a visible minority.** Of the 21 boys in the sample target, 8 (38.1%) were a member of a visible minority, 13 (61.9%) were not.

**Grade Level.** Table 3 shows the grade level frequencies of the sample target.

**Performance in school.** The frequency of performance levels was: Excellent 5 (23.8%); Good 2 (9.5%); Average 7 (33.3%); Poorly 3 (14.3%); Failing 2 (9.5%); Don't know 2 (9.5%).

### **Skills and behaviors frequencies**

Table G4 lists the frequencies of the responses to the questions asking about the skills and behaviors exhibited by each member of the sample target.

### **Cross-tabulations**

The chi-squared test for association was used to test for any significant relationships amongst the variables. One set of tests crosstabulated *visible minority* with *performance in school*, the *skills* in question 8 and the *behaviors* in question 9. No significant relationships were found. See Table G5. Another set of tests used the sample targets' *age* as a nominal variable and cross-tabulated it with the *skills* and *behaviors*, looking for clustering at a specific age. Again, no significant results were found. See Table 6.

As an exercise in exploring the data, a Chi Square test was performed on the subset of cases where the variable *age* was equal to or greater than 17 years, cross-tabulating it with *performance*. As expected, there was no statistical significance, but the total number of cases was 13, much less than the minimum recommended 30.

### **Conclusion**

Of all the relationships examined, the only relationship that was statistically significant was the number of male versus female participants who knew a boy or young man who fell within the target population. A larger study would be required to confirm whether the statistical significance had a practical significance as well.

### **Changes to Future Questionnaires**

The design of the questionnaire resulted in nearly one third of the sample not continuing with the survey because they did not know a boy or young man who fell within the target population. This is one pitfall of using a convenience sample instead of one that is randomly chosen.

In retrospect, the information on grade level may not have been needed given the availability of ages for the sample target. Instead, more may have been gained by asking if the individual had ever repeated a grade.

Information on the skills and behaviors exhibited by the sample target was limited to a nominal data type (i.e., Yes | No | Don't know). A survey targeted at parents, teachers, and other stakeholders may allow collection of ordinal data through Likert-form questions. Have this data type of data would allow correlation analyses to be performed which may provide a clearer understanding of the degree to which each skill or behavior contributes to boys' and young men's relative success in gaining access to post-secondary education.

Table G4.

*Frequencies of Skills and Behaviors Exhibited by the Sample Target*

	Yes		No		Don't know	
Skill / Behavior	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Works well with others	18	85.7	1	4.8	2	9.5
Manages time well	4	19.0	15	71.4	2	9.5
Asks for assistance when needed	7	33.3	10	47.6	4	19.0
Plays a musical instrument	8	38.1	11	52.4	2	9.5
Plays organized Sports	16	76.2	3	14.3	2	9.5
Behaves in class	12	57.1	7	33.3	2	9.5
Likes to read	11	52.4	7	33.3	3	14.3
Participates in social events	20	95.2	0	.0	1	4.8
Member of community or organization	9	42.9	12	57.1	0	.0
Is curious about the world around him	14	66.7	4	19.0	3	14.3
Likes traveling / being outdoors	17	81.0	2	9.5	2	9.5
Has been involved with police or justice system	8	38.1	11	52.4	2	9.5
Has taken drugs or consumed alcohol	9	42.9	10	47.6	2	9.5

Table G5

*Cross-tabulation of Visible Minority Attribute with Skills and Behavior*

Skill / Behavior	$\chi^2$	df	p
Works well with others	2.154	2	.341
Manages time well	1.494	2	.474
Asks for assistance when needed	0.525	2	.769
Plays a musical instrument	3.798	2	.150
Plays organized Sports	3.597	2	.166
Behaves in class	2.221	2	.329
Likes to read	0.11	2	.946
Participates in social events	0.646	1	.421
Member of community organization	0.269	1	.604
Is curious about the world around him	0.454	2	.797
Likes traveling / being outdoors	0.297	2	.862
Has been involved with police or justice system	1.485	2	.476
Has taken drugs or consumed alcohol	4.227	2	.121

Table G6

*Cross-tabulation of Age with Skills and Behavior*

Skill / Behavior	$\chi^2$	df	p
Works well with others	5.192	8	.737
Manages time well	14.653	8	.066
Asks for assistance when needed	14.282	8	.075
Plays a musical instrument	4.480	8	.811
Plays organized Sports	3.518	8	.898
Behaves in class	5.425	8	.711
Likes to read	3.926	8	.864
Participates in social events	2.625	4	.622
Member of community organization	2.319	4	.677
Is curious about the world around him	10.004	8	.265
Likes traveling / being outdoors	15.009	8	.059
Has been involved with police or justice system	3.428	8	.905
Has taken drugs or consumed alcohol	5.680	8	.683

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### Appendix

An electronic copy of the survey can be accessed at the SurveyMonkey website at the URL <http://www.surveymonkey.com/s/MTHSXW9>.

## **Appendix H**

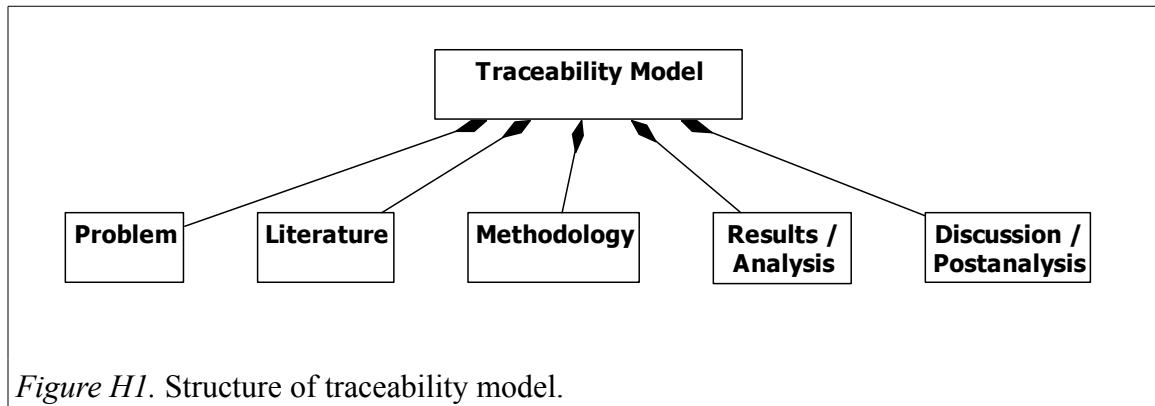
### **Traceability Model**

### **Dissertation Research Traceability Model**

Traceability is “the ability to trace (identify and measure) all the stages that led to a particular point in a process that consists of a chain of interrelated events” (traceability, 2013). In software engineering, it is a system that tracks all work on a given project back to the original requirements or requirements that reflect changes agreed to by all parties. Its overall purpose is to ensure that implementation of all requirements is included, but only those requirements. Qualitative social sciences research, by its circuitous nature, is not a straightforward process like software development can be. Nonetheless, each aspect of a research study must be traceable back to the stated purpose of the study. This traceability model attempts to provide such a reckoning.

Often, traceability on a given project is mapped using a matrix. However, converting the multitude of steps in my research into a form that might allow construction of a matrix was not seen as practical. Instead, a *traceability model* was conceived and developed by deconstructing the evolution of the process involved in preparing for and conducting the research. It uses the notation system used for the literature and theory maps. The graphical nature of the model should allow the reader to see the relationship of any part of the dissertation with its predecessors and successors. The entire traceability model is composed of five submodels, each corresponding to a chapter in my dissertation. See Figure H1.

Since the traceability model is a construct I have created, even the process of developing such a model needed to be built from scratch. Working with the idea that traceability allows for the determination of provenance of any aspect of a work product, I



started the process with the circumstances of selecting the phenomenon to be studied. As will be explained in more detail in a subsequent section, *verstehen* played a pivotal role from the outset of this research. Further, the research design followed an iterative-incremental sequence, where the need for additional investigation and inquiry was revealed with each iteration of the study.

A brief background discussion on each of the submodels follows. Afterwards, several trace cases are provided to demonstrate how the model might be used to demonstrate the traceability that was part of the research design.

### **Problem Submodel**

In my case, the general overtones of my research topic arose as a result of discussions with Michael Kompf in preparing my application to the Joint PhD program. His suggestion was to find a topic that the university might find compelling, such as a means to increase enrolment, thereby representing increased revenues. An initial literature review showed that declining enrolments of males in postsecondary education issue represented a large potential source of new enrolments. The problem submodel is really just a placeholder for the problem, with details being exposed through subsequent



reviews of the literature.

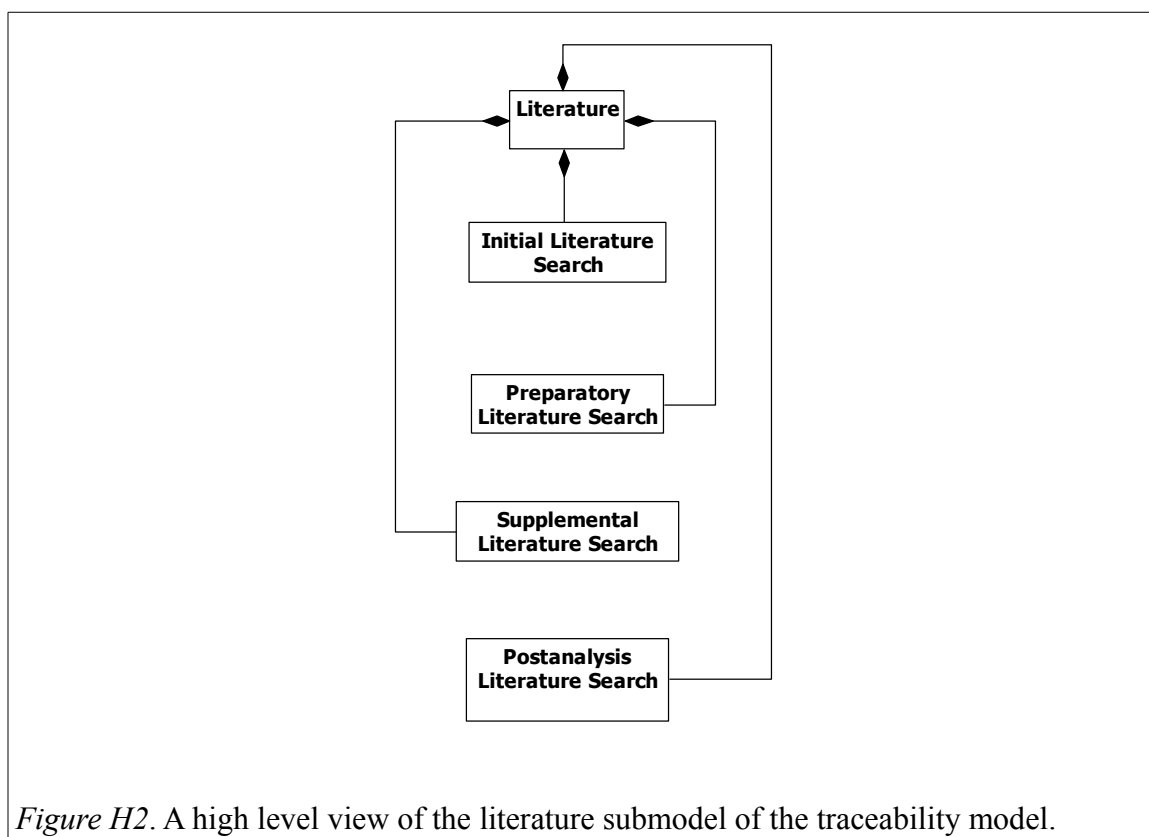
### **Literature Submodel**

The literature search activities were a major component of the *verstehen* discovery process used in the study. A high level view of the literature submodel shows that some form of literature review was performed at four different stages of the study: the initial review to identify the research problem; the preparatory literature review, conducted for the research proposal, which assisted in developing the research questions; the supplemental literature search, which provided background on new issues exposed in the exploratory interview with June; and, supplemental literature search to provide support for issues arising from the data analysis and for potential strategies suggested to mitigate some of the study's findings. Figure H2 shows the high level structure of the literature reviews. Figure H3 illustrates detailed results of those searches.

### **Methodology Submodel**

This is where constructing the model became convoluted: *verstehen* permeated every aspect of the research design. *Verstehen* appears in the methodology submodel as a placeholder. Future evolutions of the traceability model development process may necessitate treatment of *verstehen* in a different manner altogether (i.e., it is inherently part of the research process and is what separates research from other endeavours).

The methodology submodel is built around a generalized view of qualitative research, with the addition of an object for the exploratory interview/discussion with June. See Figure H4. Other aspects normally part of methodology, such as participants, ethics, etc., have been omitted because they were not seen as germane to traceability.



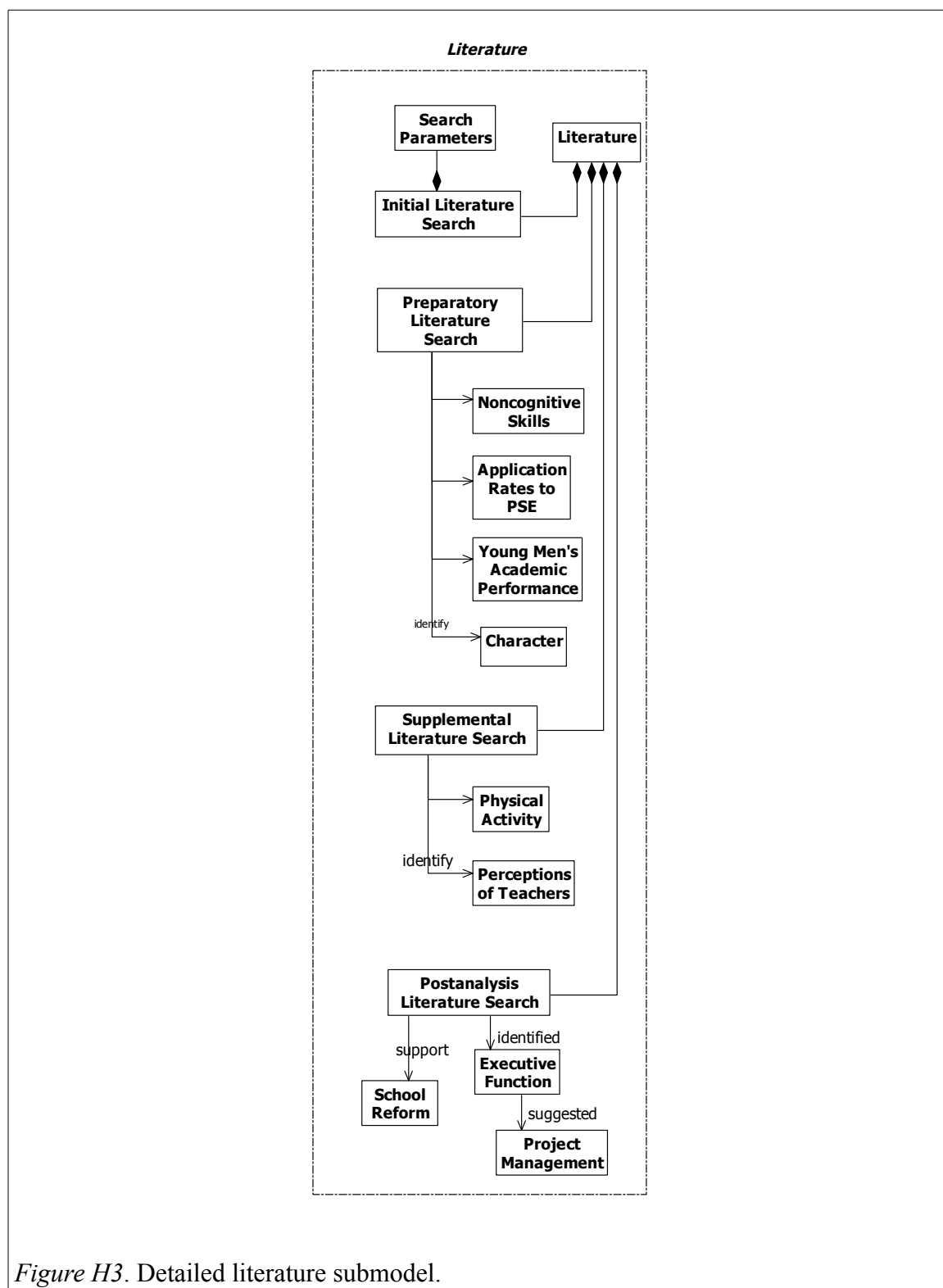
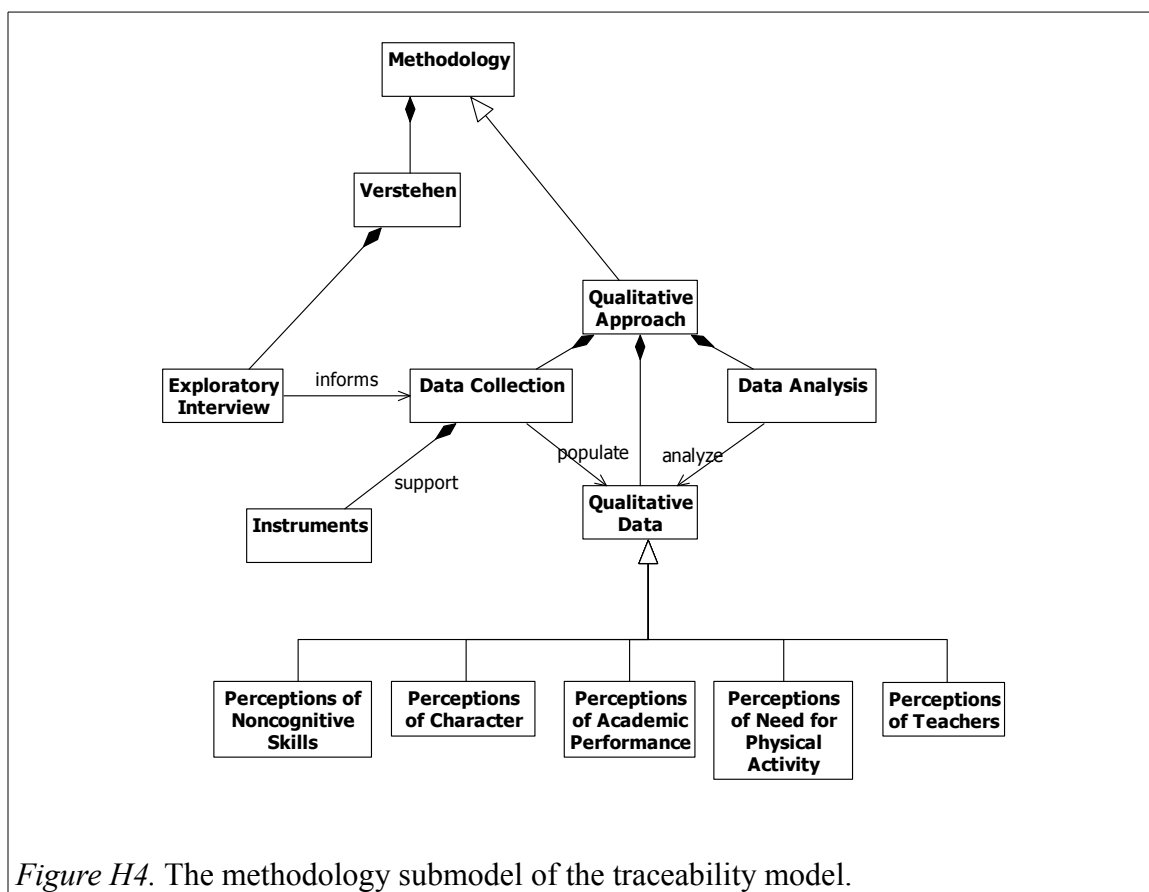


Figure H3. Detailed literature submodel.



### **Results Submodel**

The results are where the data collected from the interviews are “converted” into findings through qualitative data analysis. The results model is used to connect the study's findings back to the methodology and literature review and forward to the discussion, which dealt with measures to address issues exposed by the research. Figure H5 shows the results submodel.

### **Discussion Submodel**

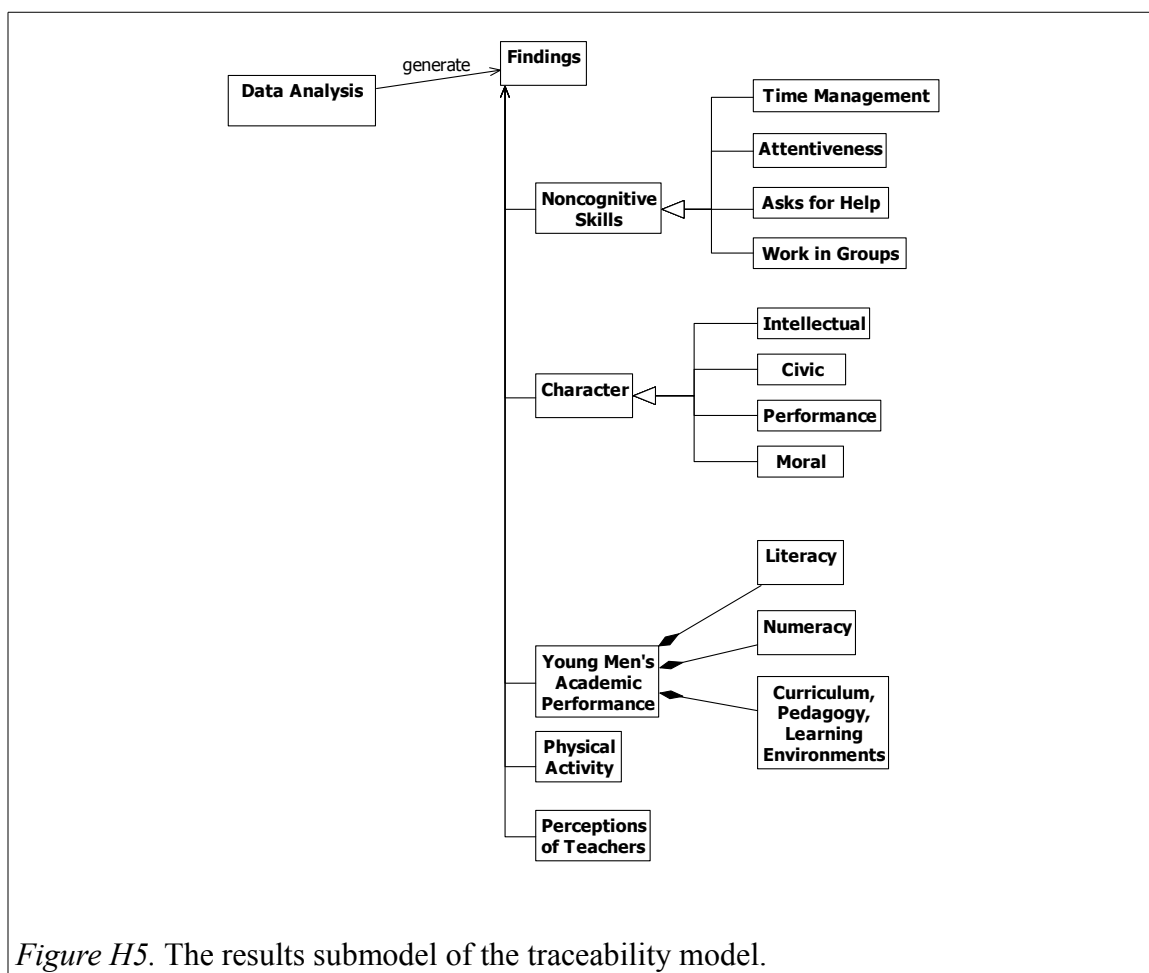
The discussion submodel is used to relate new areas of investigation exposed by the study, particularly suggestions for mitigating problems. Normally, as each component is traced through the traceability model, each path would terminate here. Figure H6 shows the discussion submodel.

Of particular interest for this study was that much of the proposed mitigation strategies required a return to the literature to discover those strategies. This is where executive function was determined be a key element in mitigating noncognitive skills deficiencies in the study's participants.

The full traceability model appears on the following page as Figure H7.

### **Tracing Concepts and Artifacts Through the Model**

In many types of problems, a traceability matrix would normally be the best construct for following a concept through a design. However, in this instance, it was deemed to be more efficient to graphically trace the evolution of an artifact. Several examples of such traces follow. These traces are not workflows. Instead, they can be considered



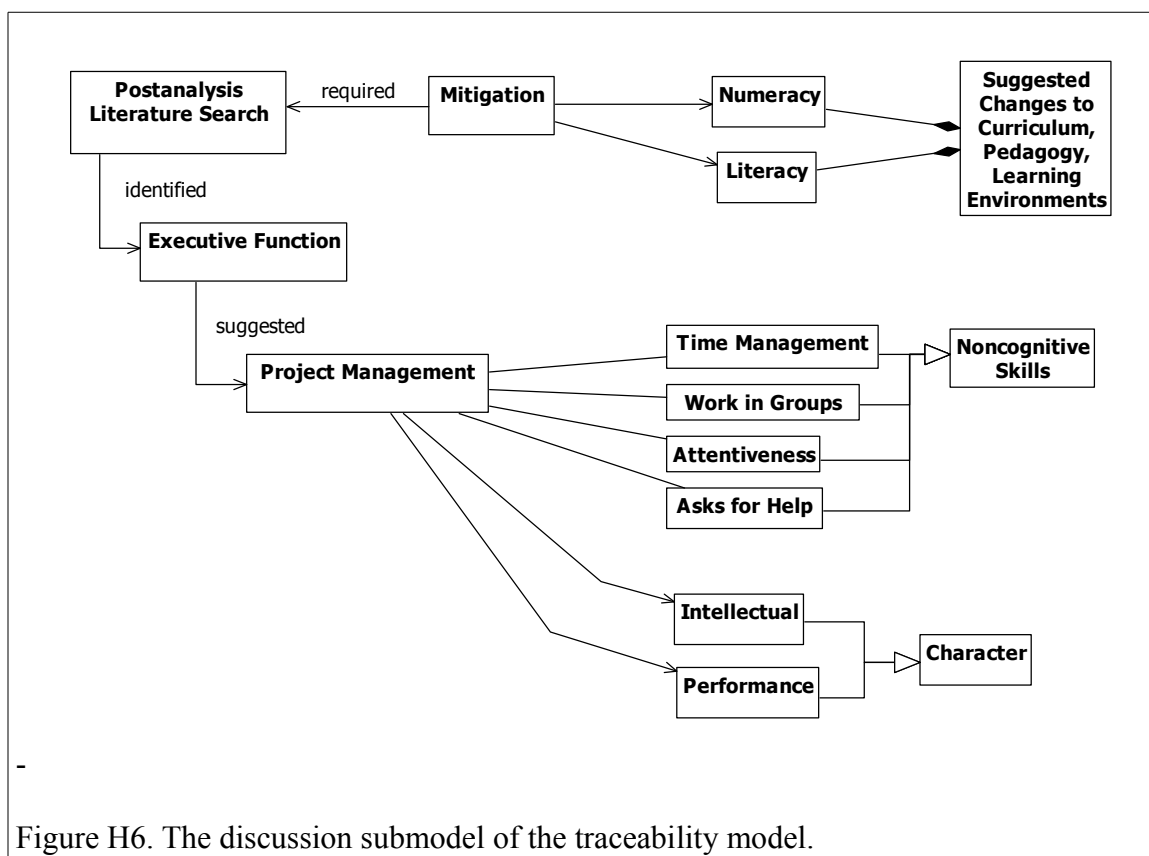


Figure H6. The discussion submodel of the traceability model.

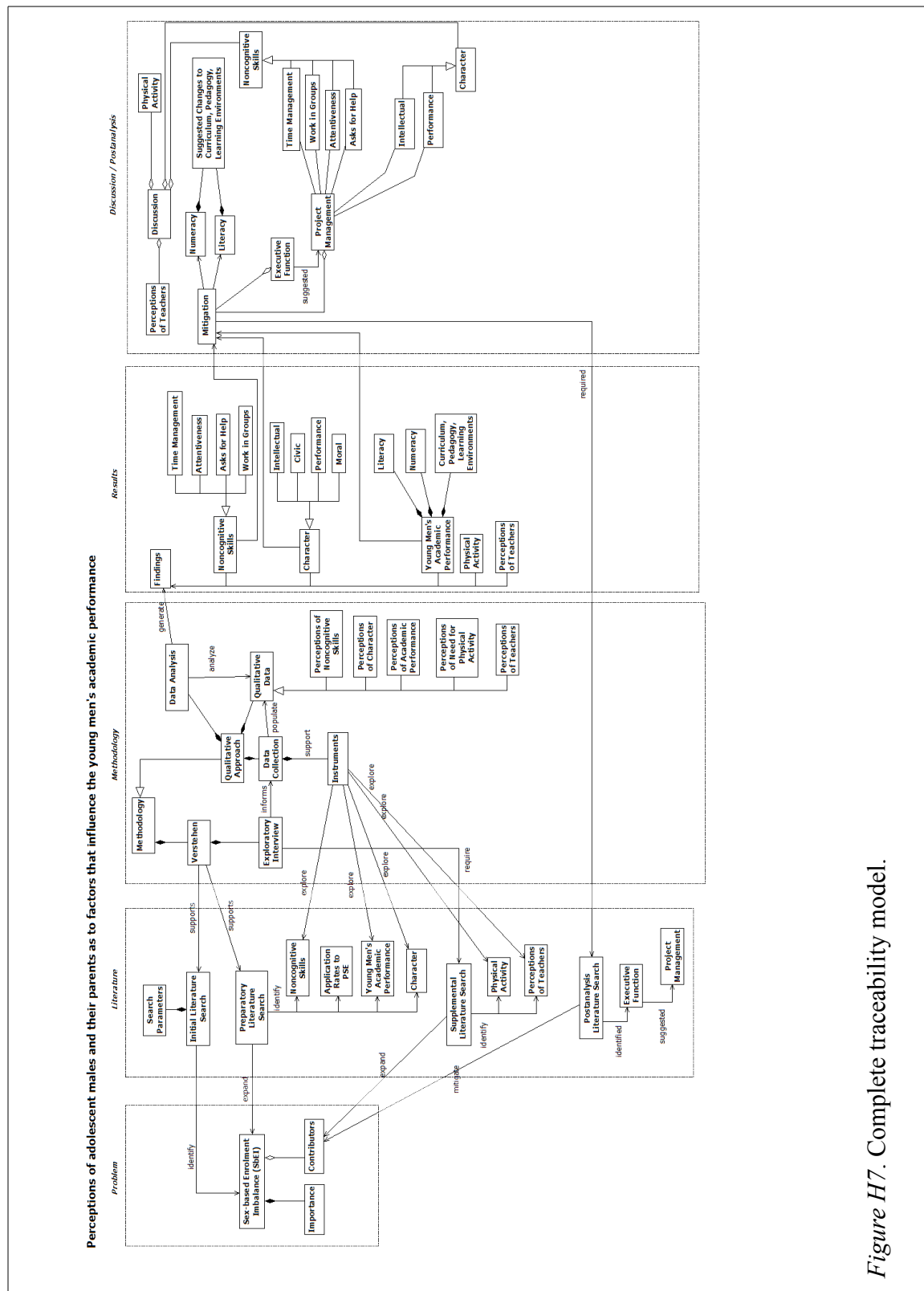


Figure H7. Complete traceability model.



breadcrumb trails that provide evidence of the inclusion of each traced concept back to the study's problem (statement).

**Noncognitive skills.**

The numbers for the trace path segments (see Figure H8) correspond to the numbers in the list below. This association is repeated for all traceability maps herein.

1. The initial literature search identified noncognitive skills as a significant contributor to/influencer of declining male enrolments (Jacob, 2002).
2. A number of questions were incorporated into the qualitative interview scripts to probe
3. each of the identified noncognitive skills.
4. Interview data on noncognitive skills was collected.
5. An analysis of that data was presented in the Results section.
6. Those results were elaborated upon in the discussion section.
7. The postanalysis literature review revealed new research on the teachers' perceptions of young men's noncognitive skills
8. The literature was examined to develop recommendations for changes to policy or practice in order to mitigate deficiencies in noncognitive skills
9. That postanalysis literature review identified “executive function” as a mechanism around which such recommendations could be built.
10. A commonality analysis identified project management theory and practice as a likely candidate around which those mitigation strategies could be built.
11. Those strategies were outlined in the Discussion chapter.

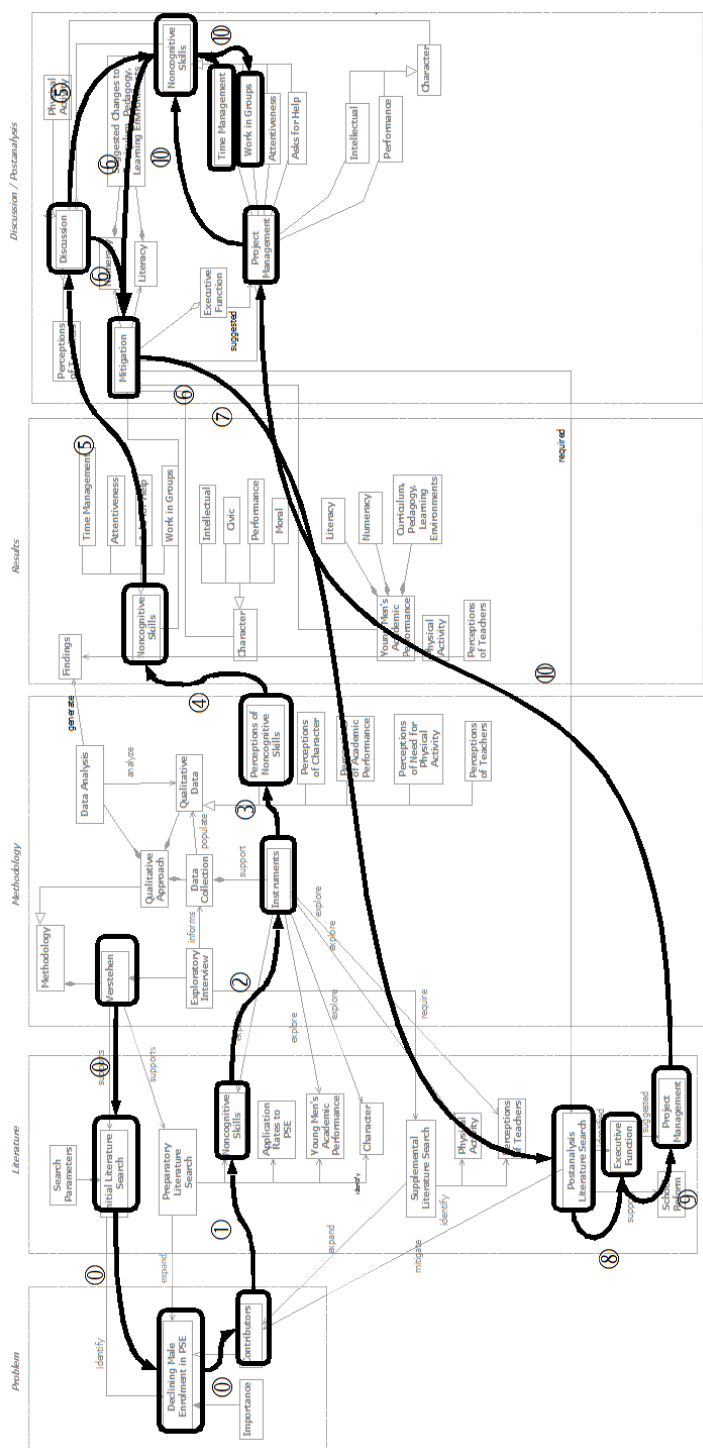


Figure H8. Traceability map for noncognitive skills

### **Character.**

Refer to Figure H9 for the traceability map for *character*.

1. Michael Kompf asked me to examine character and character education as part of my directed studies course. This work can be considered as part of both the initial literature search and the preparatory literature search.
2. That endeavour suggested that character, as opposed to character education, could be a valuable lens for understanding young men's performance in school
3. A series of questions on young men's perceptions of their character were developed and included in the interviews conducted for the study.
4. Interview data on young men's perceptions of their character was collected.
5. An analysis of that data was presented in the Results section.
6. Those results were elaborated upon in the Discussion section.
7. No mitigation strategies were presented.

Further reading since the first draft was submitted to the committee to indicate that mitigation strategies might be developed around teaching students how to innovate (Wagner, 2012).

### **Academic performance.**

Refer to Figure H10 for the *academic performance* traceability map.

1. Academic performance, particularly grades, were identified as major contributors to young males' enrolment decline in higher education (Evers, Livernois, & Mancuso, 2006).

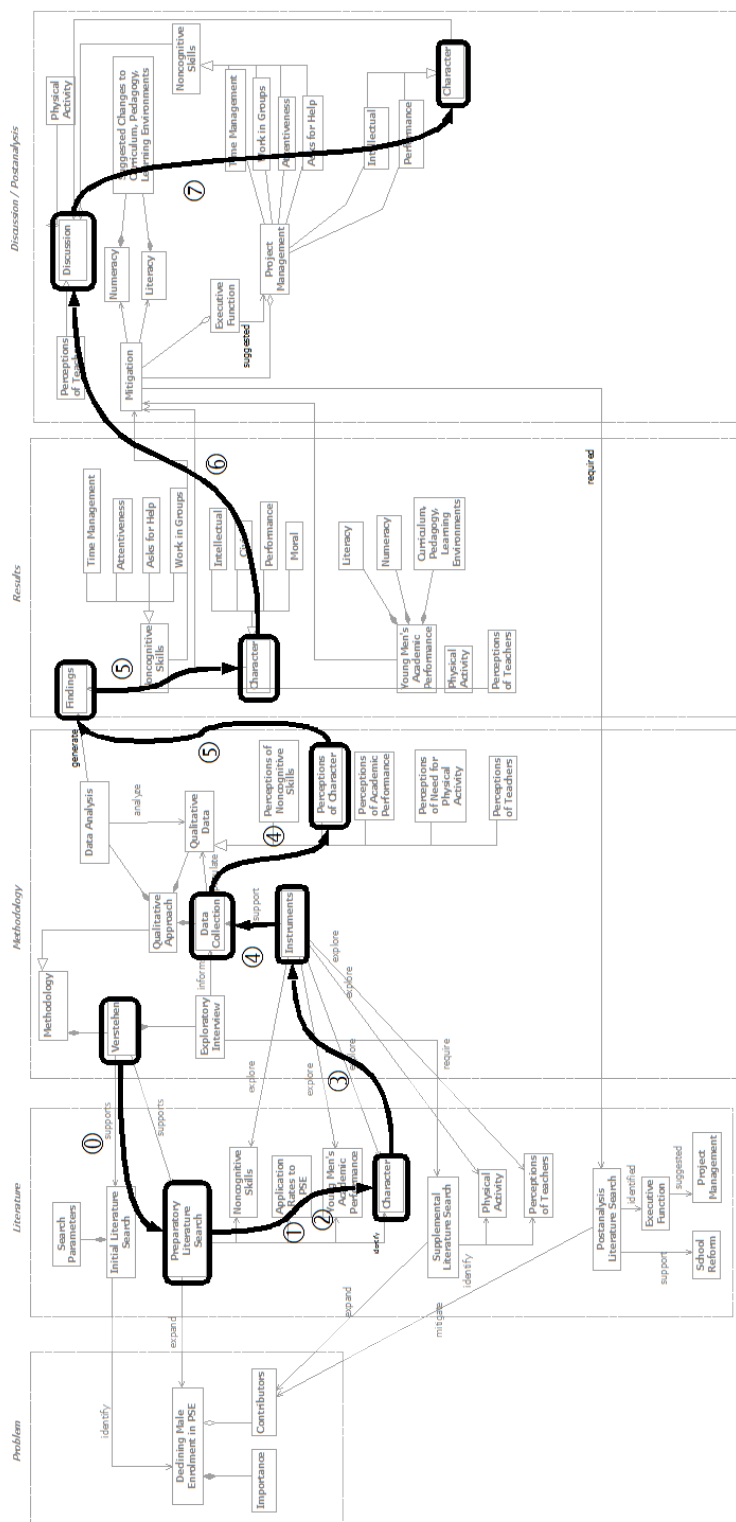


Figure H9. Traceability map for character.

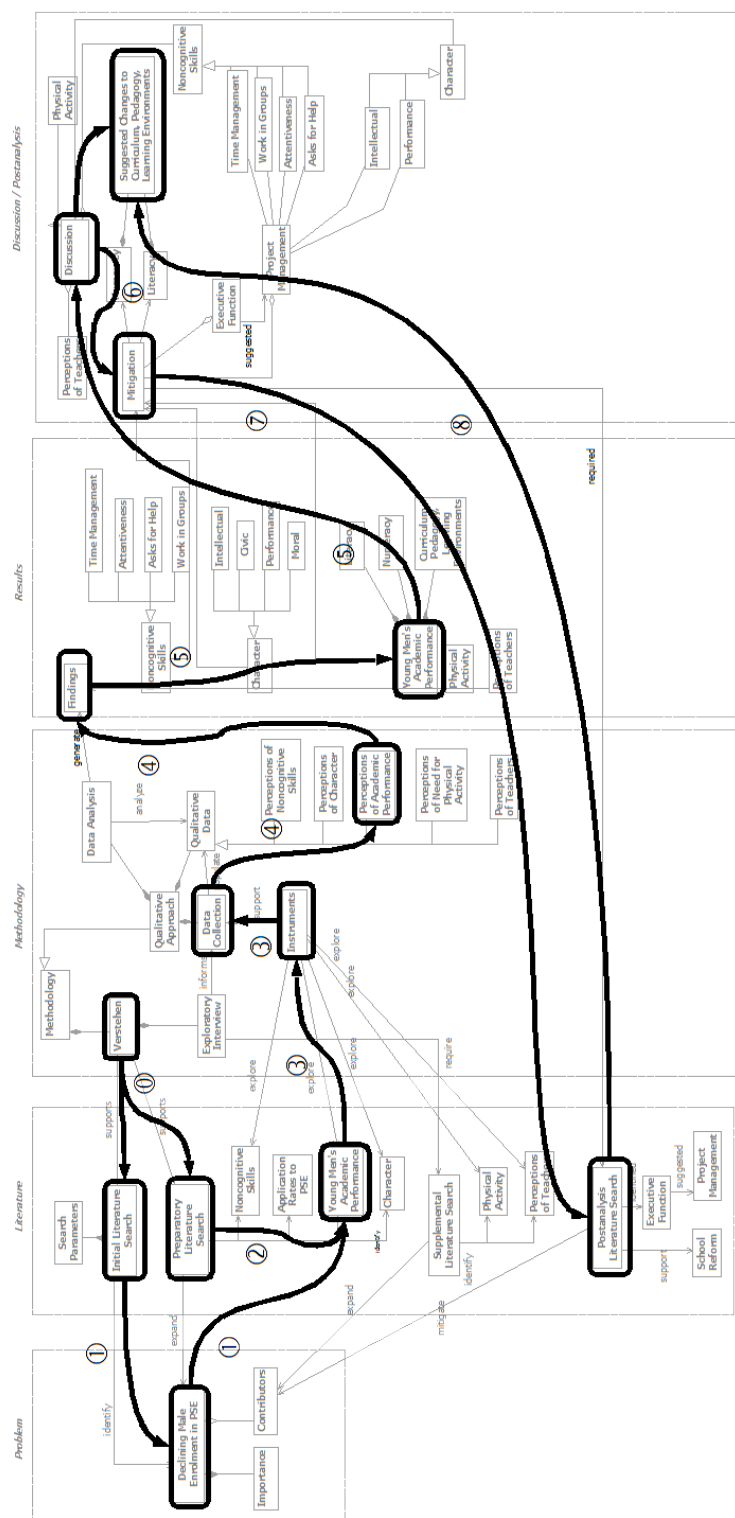


Figure H10. Traceability map for academic performance

2. Additional literature reviews in preparing the research proposal further highlighted males' academic performance as a contributor.
3. A series of questions on young men's perceptions of their academic performance were developed and included in the interviews conducted for the study.
4. Interview data on young men's perceptions of their academic performance was collected.
5. An analysis of that data was presented in the Results section.
6. Those results were elaborated upon in the Discussion section.
7. A postanalysis literature review was conducted to develop mitigation strategies for young men's academic performance. That review focused on numeracy.
8. Those mitigation strategies were outlined in the Discussion chapter.

**Physical activity.**

The traceability map for *physical activity* is presented in Figure H11.

1. First encountered the issue of physical activity—or lack thereof—in Sommers (2002). However, not being a K-12 teacher and there being two decades since my children were at equivalent ages, I did not understand its importance.
2. The exploratory interview with June exposed the issue as one that might deserve further investigation.
3. A supplemental literature review after the interview with June, but prior to the start of data collection, confirmed the importance of physical activity during the school day.

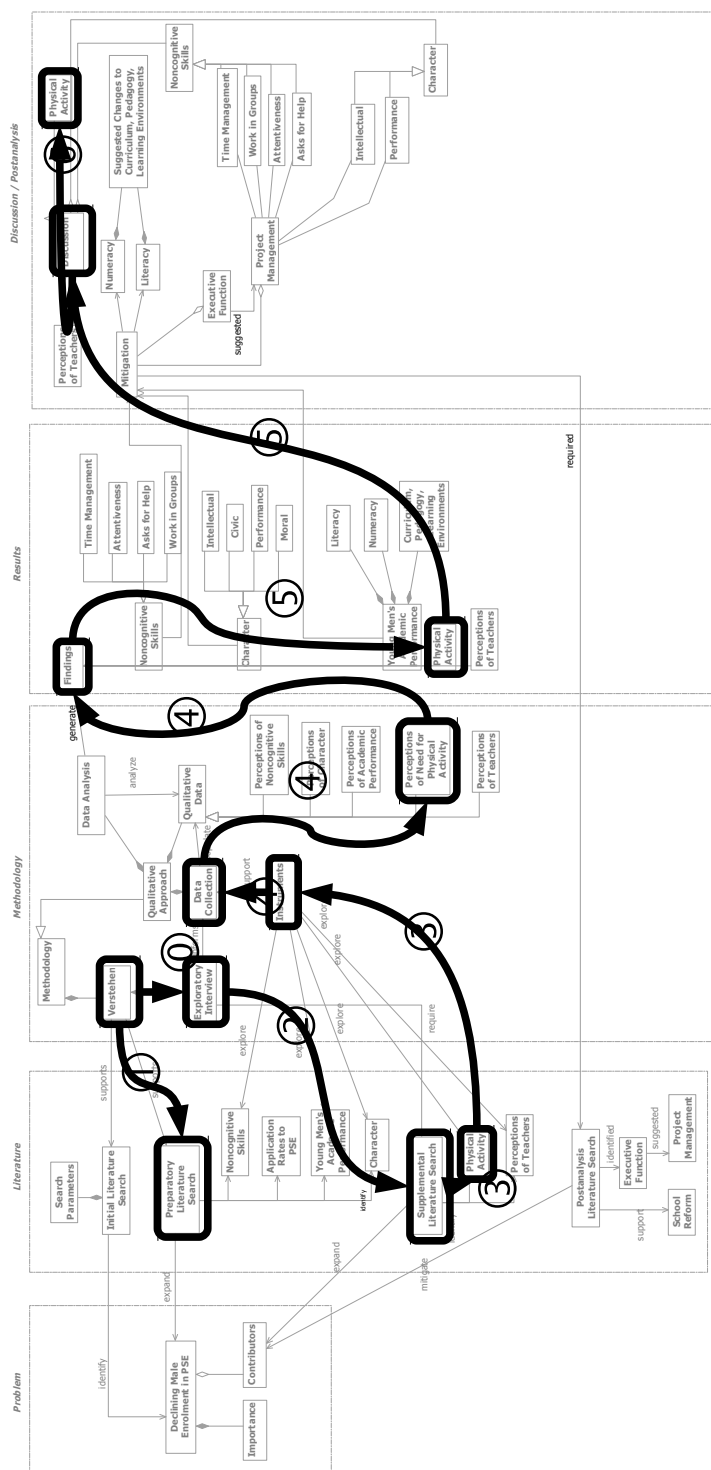


Figure H11. Traceability map for physical activity.

4. Interview data on young men's access to formal and informal physical activity as well as their involvement in organized sports was collected.
5. An analysis of that data was presented in the Results section.
6. Those results were elaborated upon in the Discussion section.

**Perception of teachers.**

Refer to Figure H12 for the *perception of teachers* trace map.

1. The exploratory interview with June exposed, for the first time, the issue of the young men's perceptions of their teachers.
2. Unlike other issues that arose in the exploratory interview with June, an additional investigation of the literature was not conducted. (In all honesty, I do not know why I did not do such a search, even a cursory one.)
3. Several questions were incorporated into the qualitative interview scripts to probe the young men's perceptions of their teachers.
4. Interview data on young men's perceptions of their teachers was collected.
5. An analysis of that data was presented in the Results section.
6. Those results were elaborated upon in the Discussion section.



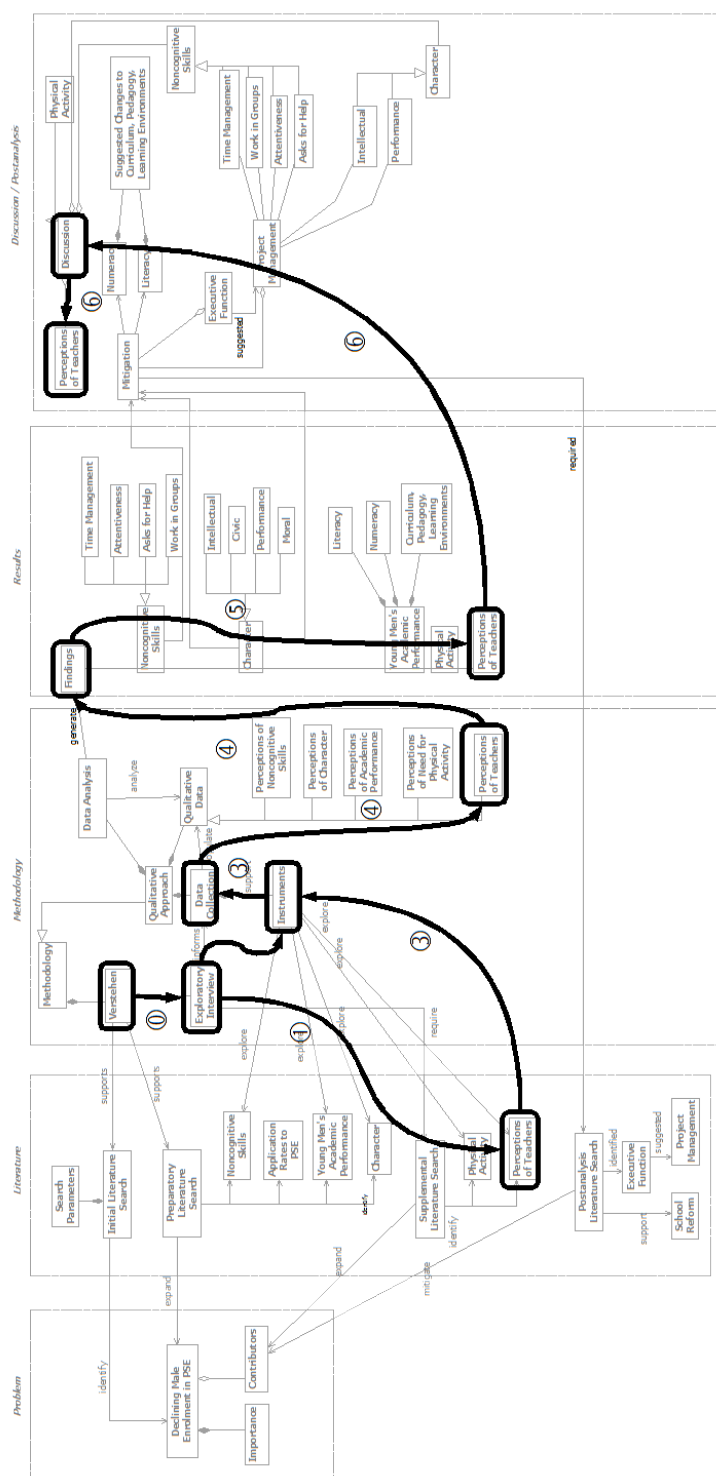


Figure H12. Traceability map for perceptions of teachers

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## **Appendix I**

### **The QDANG Method**

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## A Qualitative Analysis Framework Using Natural Language Processing and Graph Theory



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### Abstract

This paper introduces a method of extending natural language-based processing of qualitative data analysis with the use of a very quantitative tool—graph theory. It is not an attempt to convert qualitative research to a positivist approach with a mathematical black box, nor is it a “graphical solution”. Rather, it is a method to help qualitative researchers, especially those with limited experience, to discover and tease out what lies within the data. A quick review of coding is followed by basic explanations of natural language processing, artificial intelligence, and graph theory to help with understanding the method. The process described herein is limited by neither the size of the data set nor the domain in which it is applied. It has the potential to substantially reduce the amount of time required to analyze qualitative data and to assist in the discovery of themes that might not have otherwise been detected.

**Keywords:** Qualitative analysis; graph theory; natural language processing

Qualitative research is often seen by quantitative researchers as not presenting the positivist rigor that is found in quantitative studies because of its subjectivity and its dependence on “an investigator’s own style of rigorous empirical thinking, along with the sufficient presentation of evidence and careful consideration of alternative interpretations” (Yin, 2009, p. 127). A number of software applications exist to make the often copious amount of data more manageable for the analyst, but they are mostly assistive, tracking the ascription of codes and categories to specific entities in the data, but are still dependent on the inferential capabilities of the researcher-analyst. In recent years, a new class of software applications has become available that use natural language processing (NLP) as a first step in reducing the subjective nature of qualitative analysis. Some of these applications have introduced graph theory in representing the data. This report describes an analytical process developed for a recent study that incorporated techniques from standard coding processes to include the use of graph theory. The process was developed during a recent study that explored the use of distance education (DE) technologies to support lifestyle change (Tierney, 2011). Qualitative data generated during the study were limited to the transcripts from semistructured qualitative interviews. However, the methods described herein are not limited to interview analysis, particularly in the distance-learning domain. DE researchers have long used text from discussion forums in their studies, which can represent a copious amount of information when examining threads spanning an entire semester or multiple semesters. In much the same way, social media (e.g., Facebook and Twitter) represent another vast source of data. Standard coding methods require substantial investments of time and resources, which may not always be available to researchers.

The methods herein were not used as a graphical method with deterministic outcomes per se. Rather, they assisted the qualitative researcher to visualize relationships within the data. The result was a process which may hold promise in analyzing and understanding data more quickly and in presenting a form of qualitative analysis that has some aspects of positivism, but still allows the researcher the ability to examine data and provide an understanding that can only be gained through qualitative inquiry.

## Literature Review

This section provides a brief overview of the domains that form part of the new approach to qualitative data analysis, starting with the domain of quantitative text analysis. A very brief review of coding is followed by an introduction to natural language processing and its relationship to artificial intelligence and a review of the pertinent areas of graph theory. The section ends with a survey of existing software applications for computer-assisted qualitative analysis software (CAQDAS).

### Quantitative Text Analysis

Evans (1996) provided a review of the state of computer-assisted analysis of text and images in the mid-1990s. At the time,

developers of software for qualitative data analysis [had]

long known that it is most appropriate to view computers as tools with which to support rather than replace human coders, especially when so few tools exist[ed] to automate sophisticated analysis procedures. (p. 271)

However, most of his discussions in that paper dealt with quantitative rather than qualitative approaches to text and image analysis. It is unclear whether his decision to not foray into the qualitative aspects of the tools and techniques reviewed was due to positivist leanings, whether his own or the research community at the time. After all, qualitative research had only taken firm hold just a few years before, following the paradigm wars of the 1980s (Denzin & Lincoln, 2011, p. 1).

Roberts (2000) provided some history on the origins of quantitative text analysis, recounting the results of a 1955 conference of Harvard University which developed the contingency analysis method:

The first step in a contingency analysis involves counting occurrences of content categories within sampled blocks of text. This produces a data matrix ... with distinct content categories (or themes) heading the columns, unique text blocks heading the rows, and counts of occurrences (of theme within block) in the cells. The analysis proceeds by computing a matrix of associations between pairs of themes. Finally, the researcher develops (usually post hoc) explanations of why some themes co-occurred and why others were disassociated (i.e., negatively associated). (pp. 260-261)

The contingency analysis method assists the researcher in keeping track of relationships between textual elements and emerging themes, but at its heart it is still a quantitative method, relying entirely on the researcher to provide the meaning within the text.

### Coding Qualitative Data

Qualitative researchers often use broad ideas, themes, or concepts as tools for making generalizations. The analysis of this data can have nonvariable concepts or nominal-level variables (Neuman, 2006, p. 459). New or refined concepts are grounded in the data. Because concept formation is an integral part of qualitative data analysis and begins during data collection, “conceptualization is one way that a qualitative researcher organizes and makes sense” (p. 460). Data coding is used to assist this conceptualization process. Neuman (2006, p. 460) cites the description of codes by Miles and Huberman (1994, p. 56):

Codes are tags...for assigning units of meaning to the descriptive or inferential information compiled during a study. Codes usually are attached to “chunks” of varying size—words, phrases, sentences or whole paragraphs, connected or unconnected to a specific setting.

Neuman identifies Strauss (1987) as having defined the coding process, made up of three distinct kinds of qualitative data coding. (Neuman [2006, p. 460] also reiterates the Strauss [1987, p. 55] warning that “coding is the most difficult operation for inexperienced researchers to understand and to master.”) The three coding types are open, axial, and selective, and are sequential. In the first step, *open coding*, the researcher examines the data to condense them into preliminary analytic categories or codes (Neuman, 2006, p. 461). The next step, *axial coding*, requires the researcher to organize the codes, link them, and discover key analytic categories (p. 462). In the final step, *selective coding*, the researcher examines previous codes to identify and select specific passages that will support the conceptual coding categories that were previously developed (p. 464).

Large data sets “require considerable manual effort to analyze as researchers read and re-read the data to locate evidence to support or refute their theories” (Crowston, 2010, p. 1). However, most qualitative data analysis software packages primarily track the manual conceptualizations and categorization performed by the researcher; they do not assist with the conceptualization process itself.

### Natural Language Processing

“Natural language,” as the terms suggests, is language spoken or written by humans, as opposed to a language used to program or communicate with computers. Natural language processing (NLP) falls under the rubric of artificial intelligence (AI), which is the subfield of computer science concerned with the concepts and methods of symbolic inference by computer and symbolic knowledge representation for use in making inferences. Natural language understanding by computers is one of the hardest problems of artificial intelligence due to the complexity, irregularity and diversity of human language, and the philosophical problems of meaning (natural language, n.d.). AI can be seen as an attempt to model aspects of human thought on computers (artificial intelligence, n.d.). (This report does not attempt to explain the very complex computational theories, processes, or algorithms that underpin NLP software. Instead, NLP applications are treated as a black box, with a brief description of how a qualitative researcher would use NLP software.)

In its current state of development, the setup and use of AI-based software can be tedious and time-consuming because these technologies (e.g., speech and speaker recognition, biometric-based identification such as fingerprint and face recognition, and retinal scanning) require training prior to processing input data. Crowston, Allen, and Heckman (2011, p. 2) studied two methods for training NLP software. In each approach, a portion of the data set is used for training purposes, with the remainder being used to inform the research project. The first is a *rules-based* approach which is knowledge-based, analyzing linguistic phenomena that occur within text using syntactic, semantic, and discourse information. The researcher iteratively constructs coding rules for the most abundant and obvious examples for each code. Training occurs as the rules are progressively refined for coverage and accuracy. The second approach involves *machine-learning* (ML) algorithms to “automatically learn the complex patterns underlying the extraction decisions based on statistical and se-

mantic features identified in textual data” (p. 2). Crowston et al. determined that, compared to manual rule writing, the ML process was more automatic: Training data is used to train a classifier using a machine-language algorithm that infers rules for extraction using features within the dataset itself. However, in practical terms, “human coders would still have to be used to code an initial set of data for training, but from there the trained classifier could be used to infer the code labels for the rest of the data automatically, allowing coders to shift their attention to checking the machine-coded data to further improve precision, focusing on the most important and nonautomatable job of making sense of the data.

## Graph Theory

One NLP-based qualitative analysis software package uses graphs, mathematical structures used to model pair wise relations between objects from a certain collection, as one technique for representing the relationships between categories developed during analysis. Graph theory is the study of graphs and how they can be used to solve or sometimes only understand what are often very complex problems. In fact, there are graphs for which a general solution is not available, only a subset that bound by very specific conditions can be solved.

A graph refers to a collection of *vertices* or *nodes* and a collection of *edges* that connect pairs of vertices. The edges represent relationships amongst the nodes (Manber, 1989, p. 83). Any subset of a graph’s nodes and edges is called a *subgraph*. Using the simple components of nodes and edges, graphs can be used to model a large variety of both natural and human-made structures and situations.

As with all other branches of mathematics, graph theory uses very specific terminology. Graphs can be *directed*, where the relationship between the joined vertices is unidirectional and the edges are represented with an arrow. In *undirected* graphs, the relationship between the joined vertices is bi-directional, represented simply with a line (Figure 6a). An additional property of edges is that they can have a *weight* associated with them: a numerical value that quantifies the relationship of the two nodes joined by the edge (Figure 6d). Weights are sometimes referred to as *costs*. For example, the weight can represent properties such as distance, frequency, resistance, or flow.

An important aspect of graphs, which influences their analysis, is the connectedness of the vertices. A pair of vertices is *connected* if there is a path (i.e., edge) between them. In a *connected graph*, every pair of vertices are connected (Figure 1a). A *closed walk* in a graph is a path of nodes and edges between a vertex and itself (Figure 1b). A closed walk in which no edges repeat is a *circuit* (Figure 6c). A *cycle* is a circuit with no repeated vertices (Balakrishnan, 1997, p. 29; Figure 1c); an *acyclic graph* has no cycles. A specialized form of graph addressed in this report is the *tree*, a connected acyclic graph.

A lengthy discussion of the mathematics involved in studying and analyzing graphs is beyond the scope of this report. However, certain algorithms pertaining to trees are germane to the discussion because these constructs can identify relationships across entire data sets that might not be evident to all observers. A *spanning tree* of a connected, undirected graph is a tree composed of all the vertices and some (or all) of the edges in the graph (Figure



1d). Prim's algorithm (Manber, 1989, p. 208; Balakrishnan, 1997, p. 94) is used to find the *minimum weight spanning tree* within an undirected graph. Such a construct defines the acyclic subgraph that connects all the vertices of the graph at minimal cost (Figure 1e). In a subsequent section, a *maximum weight spanning tree* connects all the vertices of the graph at maximal cost (Figure 1f).

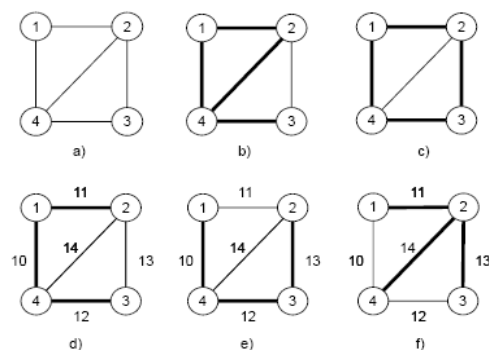


Figure 1. Graph terminology: a) Connected graph; b) closed walk (3-4-2-1-3); c) Cycle (4-1-2-3-4); d) spanning tree; e) minimal cost spanning tree; f) maximal cost spanning tree.

## Computer-Assisted Qualitative Data Analysis

Many qualitative researchers use electronic spreadsheet software (e.g., OpenOffice/LibreOffice Calc, Microsoft Office Excel) to assist with managing the coding of qualitative data. Such applications aid in the capture of codes and categories, searching data associated with specific codes and categories, and the generation of histograms and other frequency representations. The ubiquity of such applications and their relatively low cost—OpenOffice/LibreOffice Calc are open source, making them available at no cost—plays a substantial role in their widespread use, particularly among student researchers.

There are several software tools specifically designed for qualitative data analysis (QDA), such as Atlas.ti and Nvivo.

[They] manage the traditional processes of manual coding and support retrieval of coded segments (Richards, 2002)...[Some] offer capabilities for automatic coding such as supporting automated searches for keywords or regular expressions but no support for semantic or higher levels of language. (Crowston, Allen, & Heckman, 2011, p. 5)

Hence, any further development of meaning that may be found in the data becomes an inductive process for which QDA tools provide no direct assistance. Some packages (e.g., Atlas.ti) are able to present network views of the data, but these views do not provide a visualization of the frequency codes or categories nor do they report the strength/weight of the relations between codes.

Open source packages offer the researcher tools for QDA. NLP libraries such as Carrot2 and Apache's OpenNLP require additional programming to form an integrated application. RapidMiner is a mature data mining tool with text processing and visualization capabilities but would require some customization or the development of ad hoc procedures to analyze qualitative research data.

The IBM SPSS Text Analytics for Surveys (TAS) package incorporates several features which bookend the categorization process. (TAS does not use the standard code and category method where categories are mutually exclusive. Instead, it uses nonexclusive categories.) Prior to the categorization step, TAS can use NLP to identify potential categories which the analyst can then keep or discard. Once categories have been developed, the visualization component of TAS offers features not found in other packages. The researcher can use the application's graphing capabilities to create category maps which show the relative strength of the relations between categories. The analyst can filter for weight ranges, further isolating specific data for closer analysis. No other packages were found to have this visualization capability.

## Method

The study data for which this natural language processing/graph theory (NLP/GT) method was first used originated from a series of semistructured qualitative interviews on participants' experiences using distance education technologies for lifestyle modification/behavior change. Five interviews were conducted generating over seven hours of recordings. The purpose of this report is to document the qualitative analysis process, thus any further description of the study or how the data was collected is considered ancillary and therefore not presented here.

The qualitative data analysis for the study used the IBM SPSS Text Analytics for Surveys V4 (TAS4) tool (<http://www.spss.com/software/statistics/text-analytics-for-surveys/>) to analyze the interview data. There are two key differences between TAS4 and other qualitative data analysis tools (e.g., Atlas.ti, Nvivo). First, it does not rely solely on the reasoning and capabilities of the researcher to carry out the analysis. Instead, through the use of internal resources such as dictionaries, thesauruses, templates, and libraries, it uses NLP to identify keywords within the data, providing results that are more objective than researcher induction alone. Second, there is no defined hierarchy as would be found in codes and their categories: There are only categories. Further, the categories are not mutually exclusive as is normally the case for traditional coding using codes and categories, thus the meaning of a single data object can be placed in more than one category. When the researcher assigns categories to a single quotation or other data object, TAS4 looks for keywords from that data object in other quotes, assigning the same category when a keyword or synonym match are found.

TAS4 was selected for several reasons. Primarily, it was chosen on the recommendation of colleagues of the principal researcher on this study. In their experience, TAS4 substantially

reduced analysis time, sometimes by as much as 50% when compared to other methods/tools. TAS4's visualization capabilities, particularly the category maps, enable researchers to more quickly expose meaning and nuance, thus enabling the development of themes more quickly. Furthermore, the validity of the analysis results is augmented as a result of machine-processing, which could also result in time-savings by not having to reanalyze data based on questioning of data that can arise when analysis is completely subjective.

In order to replace the hierarchical nature normally found in codes and categories, a relationship which aids in the identification of themes, a hierarchy based on order of magnitude (i.e., powers of 10) was introduced. For this study, a *first order* category had at least 100 ( $10^2$ ) shared responses, a concept that has been associated with two or more categories, with other categories; a *second order* category had from 10 to 99 ( $10^1$ ) shared responses; a *third order* category had 9 ( $10^0$ ) or fewer shared responses. Figure 2 illustrates these concepts. A more generalized heuristic would define the "orders" in a data set based on the category frequencies found in that data set. Orders of magnitude seemed to be appropriate, but another researcher may decide to use another scheme based on the number of categories generated and their respective frequencies. With the order of magnitude approach, first order would include those categories whose frequencies had a factor with the highest power of ten, second order would have the second highest power of ten as a factor, and so on. The maximum number of "orders" for any dataset would be the exponent of ten in the first order frequencies plus one because the factor  $10^0$  represents the lowest order. This can be expressed mathematically, using scientific notation as

$$\text{Category frequency} = F(10^n)$$

where  $F$  is a ratio-level measurement greater than or equal to 1 and less than 10 [i.e.,  $53=5.3(10^1)$ ,  $942=9.42(10^2)$ ];  $n$  is the exponent (power) of ten, also the order of magnitude. The maximum number of orders would be  $n + 1$ . For example, a data set with the highest category frequencies being greater than or equal to 1,000 but less than 10,000, the maximum number of orders would be 4 (i.e.,  $3 + 1$ ), first order category frequencies would have a factor of  $10^3$ , fourth order categories would have a factor of  $10^0$ .

For any category, its order,  $O_c$ , would be

$$O_c = (n_{\max} + 1) - n$$

where  $n_{\max}$  is the order of magnitude of the first order categories and  $n$  is the order of magnitude of the specific category.

In order to reduce the "noise" within the category graphs, the concept of *degrees of separation* was introduced. Any two categories that had a direct relationship (i.e., they had shared responses between them) were identified as having one degree of separation. Categories that had responses common with another category, but not each other, were assigned two degrees of separation. Categories separated by two categories have three degrees of separation, and so on. See Figure 2.

## Results and Discussion

The steps in the analysis of the qualitative interview data collected for this study were as follows.

- 1) Transcripts were created from the audio recordings of the interviews.
- 2) The transcripts were then dissected to identify single concepts. Concepts are usually a single sentence or several sentences centered around a single idea.
- 3) The concepts were entered into a single electronic spreadsheet file, with each concept in its own cell.
- 4) Identifiers, unique codes for each interviewee, and demographic data were added for each entry.
- 5) Once completed, the spreadsheet file was imported into TAS4.
- 6) TAS4 processed the interview data using natural language processing to identify keywords within each quotation.
- 7) Categories with names meaningful to the study were created (e.g., role modeling, meta-cognition, trust, multimedia, etc.).
- 8) Categories were then assigned to individual quotes. Multiple categories were applied if

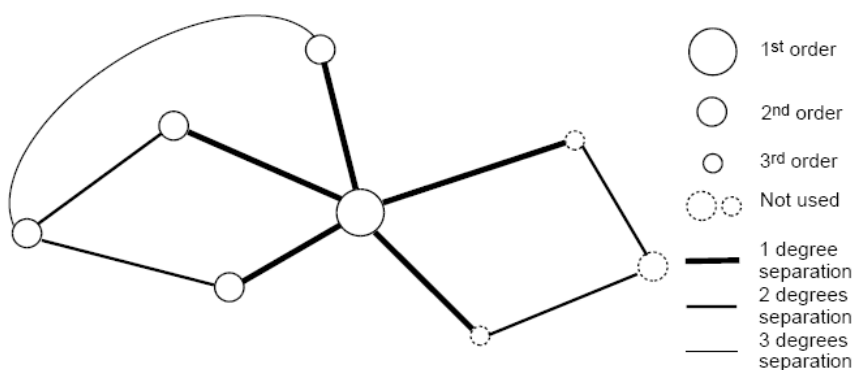


Figure 2. Code category order and degrees of separation relationships

appropriate (e.g., the quote “I am not a Facebook person” was assigned the *facebook*, *social support*, and *perception of others* categories).

- 9) If a category was improperly assigned as a result of the NLP, that quote was removed from the category. As an example, the natural language processing of the entire data set generated *people* as one of the keywords. The NLP engine uses synonyms, thus it would associate the term *person* with *people*. The quote “I am not a Facebook person” contains the

keyword person. The researcher created the category *perception of others* and linked the quote “I am not a Facebook person” to it. As a result, any data that contains the word person would automatically be associated to perception of others. The quote “I am not an ‘easy solution’ person – anything like that would not interest me” was assigned to perception of others because it contained the keyword person. However, the quote’s meaning was not about perception of others, per se, but was closer in meaning to *type of person*. The quote was removed from perception of others and linked to type of person.

10) The initial NLP generated several thousand keywords within the data. The researcher identified approximately 40 categories.

11) Five first-order categories developed. These categories were the basis of the themes found in the data analysis.

12) TAS4 created category graphs, or category webs as they are called in the software, which gave a pictorial representation of each of the first-order categories and their associated second-order categories.

The category graphs were used to develop and expand each of the themes. Most of the second order categories in a given graph had a direct relationship to the given first-order categories, hereafter referred to as having one degree of separation. Others only had an indirect relationship to the first-order category, and these were designated as having two degrees of separation. Figure 3a illustrates these concepts. Third order categories and categories with more than one degree of separation were not used in order to reduce the amount of “noise” in the graph. Figure 3b illustrates the difference between the original graph for the category *trust* and when third order categories have been removed. A third graph must be created that removes all categories and links with more than one degree of separation (Figure 3c). TAS4 was not able to isolate interview data between a given theme category and just one of its meaning categories. To overcome this limitation, an electronic spreadsheet file was constructed to allow examining only those data objects that were shared between the two categories.

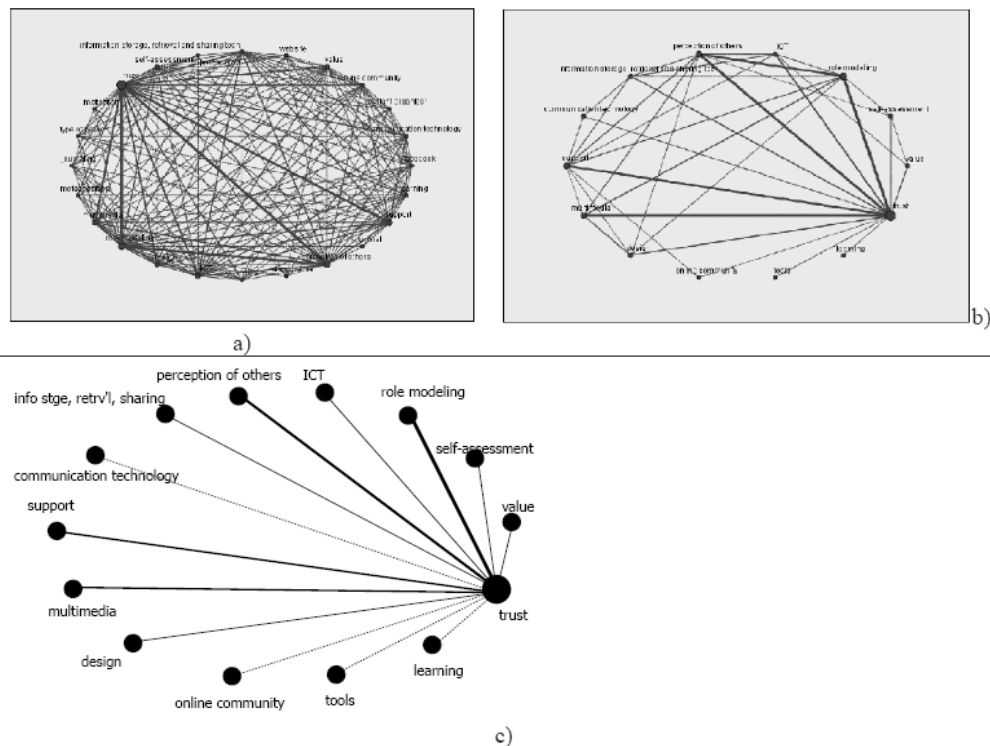


Figure 3. Shared response graphs for the “trust” category: a) all responses and categories; b) all third order categories removed; c) all remaining second degree categories removed, leaving a first order category tree.

### Categories Developed From Study Data

The transcribed interview data was broken down into 505 concepts. Using the natural language processing of TAS4, 38 categories were developed. Table 1 lists those categories and the number of concepts associated with each one.

Table 1

*Categories Frequencies*

		Concept
Category		frequencies
First-order categories		
role modeling		158
multimedia		141
trust		118
design		117
support		106
Second-order categories		
self-assessment		92
ICT		90
perception of others		88
journaling		71
value		68
info storage, retrieval and sharing tech		60
learning		48
metacognition		45
tools		44
content organizer		38
preparation		26
website		22
type of person		15
online community		15
weight control beliefs		14
facebook		12
motivation		10
tutorial		10
Third-order categories		
communication technology		9
dissonance		9
self-aware		8
self-efficacy		7
resilience		7
non sequitur		6
contemplation		5
limited time		3
content		2

### Theme Discovery

The use of graphs is not intended to be a graphical method of analysis with deterministic outcomes. Instead, their purpose is to aid the qualitative researcher, especially novice qualitative researchers, in discovering any structures that lie within the data and their relationships with the research question(s). To start the theme discovery within the study data set, a graph was constructed that included all the first order categories and the single degree of separation relationships between them. See Figure 4. Using the maximum spanning

tree method from graph theory, a graph was constructed that contains all of the first order categories and only the relationships amongst those activities with the highest shared response rate. See Figure 5. Upon examination of the maximum spanning tree graph, a number of category pairings were identified: design | multimedia; multimedia | role-modeling; role-modeling | trust; trust | support. These pairings were then qualitatively analyzed for meaning.

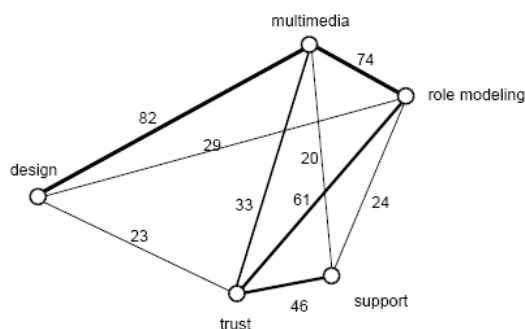


Figure 4. First-order category graph

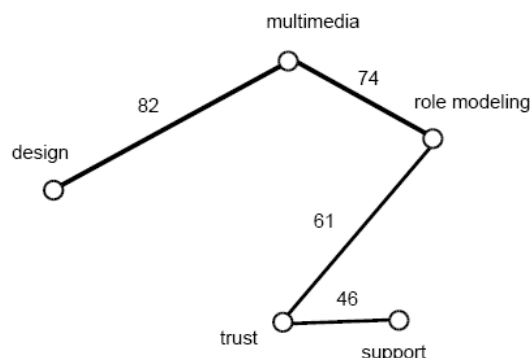


Figure 5. Maximum cost spanning tree of first order category graph.

Themes could have been developed from the maximum cost spanning tree using three subgraphs: role modeling—multimedia—design; multimedia—role modeling—trust; and, role modeling—trust—support. However, there was no obvious way, through the included edges, to relate the start and end nodes of each subpath thereby creating more cohesive themes. Therefore, in order to find such logical connections within the data, the first order category graph was revisited, removing all relationships among the first-order categories with less than approximately 24 shared responses (Figure 6). This resulted in the identification of three cycles in the graph that might help in better formulating the themes (Figure 7):

- role modeling, multimedia, and design (Figure 7a);
- role modeling, multimedia, and trust (Figure 7b);



- role modeling, trust, and support (Figure 7c).

Based on these combinations, three themes were developed. These themes and what they mean for distance-based lifestyle change are as follows: 1) Online multimedia resources for lifestyle change should be designed for role modeling; 2) Online multimedia for the purpose of

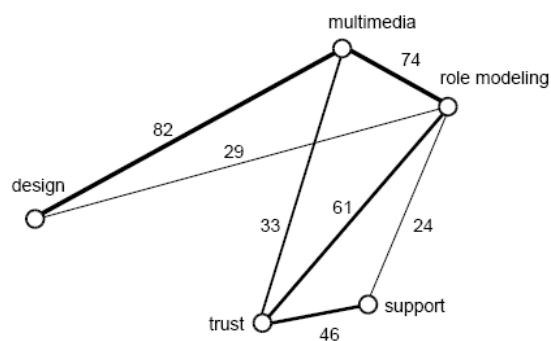


Figure 6. Reduced first order category graph

role modelling should promote a sense of safety and security, avoid risk of physical or emotional harm, and ensure that only accurate up-to-date information is provided; 3): Social support for lifestyle change should involve trusted role models.

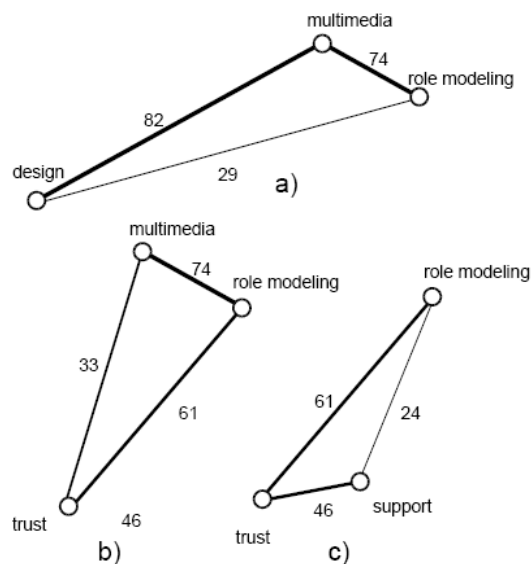


Figure 7. First-order category trinarities

## Conclusion

Analyzing qualitative data can be a laborious and at times pedantic, time-consuming process. Conceptualization, especially for new researchers, can be very difficult to master. A new class of qualitative data analysis software which uses natural language processing offers tools to both simplify and accelerate the discovery of new themes and theory within that data. The concepts presented in this paper have built on natural language processing to further accelerate the discovery of what lies within the data.

This project has exposed opportunities for further research in several areas. No formal comparison was made with other tools such as Atlas.ti or Nvivo prior to embarking on the use of TAS4. Nonetheless, TAS4 does appear to have some strengths over these other software packages. Its nonexclusive use of categories uniquely allows for the generation of graphs. And with the ability to build and extend templates, the speed of analysis is almost certain to be increased when working on data sets within a given field, compared to other tools. (For the demonstration project described in this report, the categorization and theme development for 505 concepts took less than two days.) A study to identify such time savings would prove very useful in supporting the use of graph theory and natural language processing for qualitative data analysis. The cost of applications like TAS4 represent a substantial barrier to their adoption, especially in academia. The availability of open source natural language processing packages and other data/text mining software (e.g., Apache NLP, RapidMiner) may represent an avenue to the wider adoption of NLP-based qualitative data analysis.

As with all new approaches, only their use in different situations can help to debug and refine them. It is hoped that others will do exactly that to enhance the robustness of using graph theory with qualitative data natural language processing. In addition to new validation attempts of the method based on first order categories, analysis at a finer granularity than was attempted in the study for which the method was developed needs to be carried out. It is believed that when second and third order relationships are included, very subtle nuances can be discovered and teased out, further strengthening the contributions of qualitative studies.

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